For Reference

NOT TO BE TAKEN FROM THIS ROOM

For Reference

NOT TO BE TAKEN FROM THIS ROOM

Ex libris
universitatis
albertaensis

UNIVERSITY OF ALBERTA
QUAECUMQUE VERA

University of Alberta
Printing Department

Digitized by the Internet Archive
in 2018 with funding from
University of Alberta Libraries

https://archive.org/details/descriptiveanaly00gall

Thesis
1964
#24

THE UNIVERSITY OF ALBERTA

A DESCRIPTIVE ANALYSIS OF INDUSTRIAL ARTS IN ALBERTA

by

JAMES EMMET GALLAGHER

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF EDUCATION

DEPARTMENT OF SECONDARY EDUCATION

EDMONTON, ALBERTA

DECEMBER 1963
1964

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "A Descriptive Analysis of Industrial Arts in Alberta" submitted by James Emmet Gallagher in partial fulfilment of the requirements for the degree of Master of Education.

Date December 18, 1963

ACKNOWLEDGMENTS

The writer wishes to express his thanks to his advisor, Dr. L. W. Downey, and to the other members of his thesis committee, Dr. H. R. Ziel, Dr. R. W. Stadt, and Mr. R. H. Cunningham, for their helpful suggestions, valuable guidance, and constructive criticism.

Appreciation is also expressed to three friends and colleagues, Mr. A. G. McBeath, Mr. R. L. C. Baker, and Mr. J. M. Black for their interest in this study and continued assistance throughout.

Special thanks are extended to Dean H. T. Coutts for his time and assistance in the preparation of this thesis.

TABLE OF CONTENTS

CHAPTER PAGE

I. INTRODUCTION 1

The Problem 2

The Importance of the Problem 4

Procedure of the Study 6

Limitations of the study 7

Introduction to the text 8

II. THE COMPATIBILITY OF THE INDUSTRIAL ARTS OBJECTIVES IN ALBERTA WITH THE GENERAL OBJECTIVES OF SECONDARY EDUCATION 11

The General Objectives of Secondary Education 11

Functional objectives of the Alberta secondary schools 12

Factors influencing acceptance and emphasis of a subject area 15

Objectives of the Alberta Industrial Arts Program . . . 23

III. THE POINT OF EMPHASIS OF INDUSTRIAL ARTS 30

The Development of Industrial Arts 31

The Russian system of technical training 32

Educational sloyd 32

Manual training 33

Manual arts 33

Industrial arts education 34

Summary 36

CHAPTER PAGE

Contemporary Thought in Industrial Arts Education 37

The Points of Emphasis of Industrial Arts Objectives in Alberta 43

Categories 44

The Points of Emphasis of Other Lists of Industrial Arts Objectives 49

Selection of lists of objectives 50

Method of categorization 51

Trade and job analysis objectives 51

Behavioral change objectives 55

Industrial categories objectives 59

A Comparison Between Points of Emphasis in Industrial Arts Objectives in Alberta and the General Points of Emphasis in Industrial Arts Objectives 65

Critique of industrial arts objectives in general . . . 65

Common points of emphasis in industrial arts objectives 69

Critique of the industrial arts objectives in Alberta . 70

Summary and conclusions 72

IV. PROGRAMS OF INDUSTRIAL ARTS 74

Rationale 74

Definition of terms 74

Process and purpose of analysis 76

The meaning of general education in Alberta 79

The major industrial classifications in Alberta and Canada 84

CHAPTER PAGE

The Program of Industrial Arts in Alberta 89

Level I 90

Level II 91

Level III 92

Level IV 96

Related to the criteria particular to industrial arts programs 98

Programs of Industrial Arts Suggested by the Three Major Approaches 103

Programs of the trade and job analysis approach . . . 104

Programs of the behavioral change approach 107

Program of the industrial categories approach 109

Summary of courses in representative programs 114

Related to the criteria particular to industrial arts programs 115

A Comparison of the Industrial Arts Program in Alberta with Representative Programs of Industrial Arts . . . 123

An Alternative Program of Industrial Arts 127

Summary 134

V. CONCLUSIONS AND RECOMMENDATIONS 138

Conclusions 138

Recommendations 144

SELECTED BIBLIOGRAPHY 149

APPENDIX - Labour Force by Industry and Sex, for Canada and Alberta, 1961 157

LIST OF TABLES

TABLE PAGE

I. Objectives of Industrial Arts Interpreted as Compatible with the General Objectives of Secondary Education in Alberta 26

II. Categorization of Industrial Arts Objectives in Alberta 48

III. Categorization of Trade and Job Analysis Objectives of Industrial Arts 54

IV. Categorization of Behavioral Change Approach Objectives of Industrial Arts 58

V. Categorization of Industrial Categories Objectives of Industrial Arts 62

VI. Categorization of Industrial Arts Objectives in Alberta and those of Representative Approaches 63

VII. Major Industrial Classifications in Canada 86

VIII. Major Industrial Classifications in Alberta 87

IX. Courses Included in the Industrial Arts Program in Alberta 97

X. Relationship of the Industrial Arts Courses in Alberta to the Major Industrial Classifications in Canada 100

XI. Relationship of the Industrial Arts Course in Alberta to the Major Industrial Classifications in Alberta . . . 100

XII. Summary of Representative Programs of Industrial Arts . 113

XIII. Relationship of Trade and Job Analysis and Behavioral Change Programs to the Major Industrial Classifications in Canada 117

TABLE PAGE

XIV. Relationship of Trade and Job Analysis and Behavioral Change Programs to the Major Industrial Classifications in Alberta 118

XV. Relationship of the Industrial Categories Program to the Major Industrial Classifications in Canada 121

XVI. Relationship of the Industrial Categories Program to the Major Industrial Classifications in Alberta 122

XVII. Comparison of Representative Programs of Industrial Arts 124

LIST OF FIGURES

FIGURE PAGE

1. An Illustration of the Plan Used in this Study 7

CHAPTER I

INTRODUCTION

If professional writing and research are valid indicators of academic stature, Industrial Arts education occupies a very lowly position, indeed. The literature in industrial arts education reveals that students in the field are faced with two major problems: first, that no clearly-defined, logically-consistent theoretical structure has been accepted to the point that it significantly influences practices in the field of industrial arts, and second, that inconsistencies exist between the several sets of objectives of industrial arts and the respective programs of industrial arts which operate in the schools.

It is generally assumed that industrial arts should be regarded as a subject area of general education. It is usually assumed further that industrial arts should be concerned with the development of understandings pertinent to the productive aspects of society. But the literature in the field clearly indicates that once these two observations have been made, little else remains upon which there is consensus.

Svendsen, the editor of the 1963 Yearbook of the American Industrial Arts Association, disturbed by the basic problems evident in industrial arts education, commented as follows:

> It seems strange that a curriculum area whose existence can be so easily and logically substantiated, an area with such broad and deep sources of content and with so apparent and demanding a mission--it seems strange that such an area of study should lack prestige and be refused a position of importance equal to that of any other area in the curriculum. Moreover, the criticism of industrial arts education that arises from without as well as from within the ranks of its own practitioners appears to many to be equally surprising.

> This is not to say that all criticism can or should be avoided. But when the quantity and effectiveness of such criticism mounts to a crucial limit, attention to it and investigation is required.[1]

Olson was more abrupt than Svendsen, but his observation was very similar:

> The industrial arts profession does not really know what industrial arts is.
>
> This statement should get an immediate and opposite reaction, but instead, it will likely be agreed with more often than not. The profession through the years has been marked by a diversity of concept rather than by a unity. . . .[2]

The impression one gets from a survey of the literature is that every major aspect of industrial arts education is in need of research: its functions and objectives; its programs; the instructional methods, materials and facilities employed; and the various groups it serves.

I. THE PROBLEM

The general purpose of the study to be reported here was to examine the objectives and programs of industrial arts education and to suggest for the Province of Alberta a pattern incorporating these. The study was initially designed to be an examination of the objectives and program of industrial arts in Alberta. It became apparent, however, that the objectives and program of industrial arts in Alberta could be examined critically only in light of an examination of the objectives and

---

[1] E. A. T. Svendsen, Action and Thought in Industrial Arts Education. 12th Yearbook, American Council on Industrial Arts Teacher Education. (Bloomington, Illinois: McKnight and McKnight Publishing Co., 1963), p. 17.

[2] D. O. Olson, "Technology and Industrial Arts," (Published Doctoral dissertation, Kent State University, Columbus, Ohio), 1957, preface.

programs of industrial arts education in general. The study, therefore, was expanded to include a comparison of industrial arts objectives and programs in Alberta with those described in the literature.

Nine specific purposes established the scope of this study. They were:

1. To examine the ease of acceptance and degree of emphasis accorded industrial arts as one of many subject areas in the curriculum of secondary education.

2. To examine the degree of compatibility between the objectives of industrial arts and the general objectives of secondary education in Alberta.

3. To determine the subject matter of the field, as indicated by lists of objectives of industrial arts in current literature on industrial arts education.

4. To compare the objectives of industrial arts in Alberta with objectives of industrial arts in general.

5. To determine the particular characteristics of industrial arts education.

6. To develop criteria for the evaluation of industrial arts programs.

7. To examine industrial arts programs and relate them to the evaluative criteria.

8. To compare the industrial arts program in Alberta with programs of industrial arts in general.

9. To suggest needed research relevant to industrial arts objectives and programs with specific reference to the province of Alberta.

II. THE IMPORTANCE OF THE PROBLEM

The general need for research in industrial arts education has already been documented. The reasons for this particular study, however, were much more specific.

Industrial arts has been an approved subject in the Province of Alberta since 1945.[3] During this eighteen year period no critical examination of any facet of this subject area has been published. New courses have been added to the program and curriculum guides revised, but no critical analysis is available which deals with the objectives and program of industrial arts in Alberta. The fact that a study of this kind has never been done is perhaps reason enough for doing it. However, there were two additional important reasons for making this study.

One of the methods by which improvements in practice develop in any area of education is through critical analyses of those areas. The need for such analyses is accentuated in a society experiencing rapid social and technological changes. Canada is such a society. Population mobility, urban growth, immigration, improved communication and transportation systems and the growth of industries are factors which have influenced changes in the educational environment in Alberta. Because the methods, processes, and products of industry are constantly changing, the subject area which exists primarily for making

---

[3] Province of Alberta Department of Education, Fortieth Annual Report. (Edmonton: Queen's Printer, 1945), p. 53.

this aspect of our culture understandable to our youth was considered to be in need of examination and evaluation.

The full impact of the recent Technical and Vocational Training Assistance Act, Bill C-49, which prompted the building of a large number of vocational high schools in Alberta is not yet known. To date, Alberta has taken advantage of the Federal financial assistance to a degree second only to the Province of Ontario. As a result of the recent provisions most areas of Alberta for the first time have access to vocational course offerings for secondary school students. The new vocational high schools have constrained those school boards participating in this venture to establish new policies and clarify existing ones related to the selection of students for certain programs at the senior high school level.

The establishment of vocational education facilities also provided an impetus for curriculum committees to examine the content of other subject areas in the secondary schools. There appeared to be a close relationship between some courses in industrial arts and certain areas of vocational education. A clearly-defined relationship, however, was considered to be lacking. The Alberta Royal Commission on Education was concerned about this lack of a clearly-defined relationship, and stated:

> The Commission's impression is that some of the electives provided go beyond the requirements of general education and approach a degree of vocational training which is incomplete and ineffective. The difference between general mechanics and subjects such as woodwork, metalwork, and automotives illustrates a somewhat indistinct line between general education and vocational education. Since the Commission holds that vocational education must be thorough, practical and immediately useful, it suggests that the latter courses

> represent inadequate vocational training. Their inclusion among general electives can only perpetuate fragmentary vocational programs.[4]

This study, therefore, considered the need for a clearly-defined relationship between the objectives and programs of industrial arts and the objectives and programs of vocational education to be an important one.

III. PROCEDURE FOR THE STUDY

Plan for the study. The study was conducted by an ordering and analysis of literature in the field of industrial arts education.

Selected authors who supported the three major approaches which have been taken to industrial arts education were considered representative of industrial arts in general.

The data for the Alberta program of industrial arts were obtained from industrial arts curriculum guides issued by the Department of Education in the Province of Alberta.

The process of descriptive analysis which was used in this study is depicted in Figure 1.

---

[4] Report of the Royal Commission on Education in Alberta 1959. A report submitted by Hon. D. C. Cameron, Chairman (Edmonton: The Queen's Printer, 1959), p. 136.

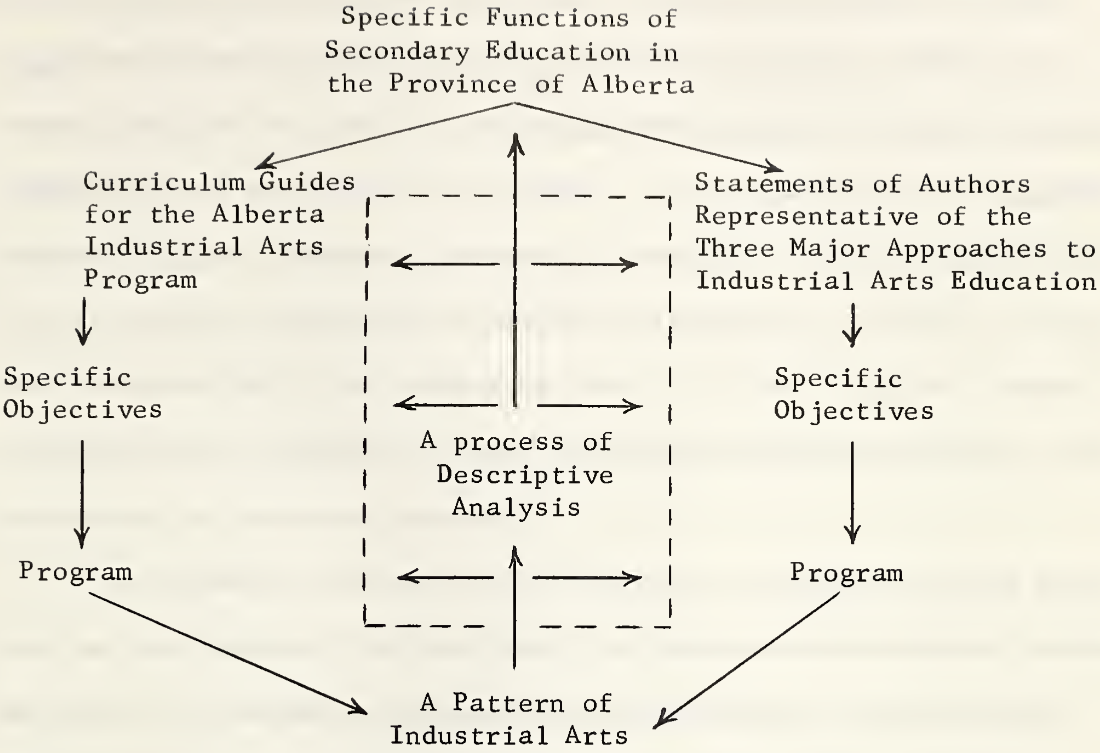
Specific Functions of Secondary Education in the Province of Alberta
Curriculum Guides for the Alberta Industrial Arts Program
Statements of Authors Representative of the Three Major Approaches to Industrial Arts Education
Specific Objectives
Specific Objectives
A process of Descriptive Analysis
Program
Program
A Pattern of Industrial Arts

Fig. 1. An Illustration of the Plan Used in This Study

Limitations of the study. In the examination of the compatibility of objectives and programs of industrial arts in Alberta, this study was concerned only with the data contained in the industrial arts curriculum guides applicable to the junior and senior high school levels.

The curriculum guides stressed the fact that the suggested learning experiences recommended by the Department of Education were to be considered as minimum, and that the industrial arts teacher was to exercise his initiative and professional freedom to build on this base. The freedom to adapt and enlarge the suggested minimum base

[illegible]

[illegible]

[illegible]

had the very real result of producing a difference between what was suggested as practice and what was actually practised. While some actual practices may not have met suggested minimum learning experiences, others may have surpassed the minimum. An examination of the suggested minimum program, therefore, provided a consistent base for analysis but did not describe variations in specific situations. (In fact, it may not have described a real situation at all. If this were so, however, then the need to establish a sound and usable theoretical structure was considered all the more important.)

An exhaustive survey of the literature on industrial arts education was not possible for this study. A process of selection of authors who would be considered representative of industrial arts in general was, therefore, necessary. A limitation of this study, consequently, was that the authors selected constituted a representative sample of industrial arts education generally.

Introduction to the text. The text of this thesis discusses in turn the three broad areas which were examined. The general objectives of secondary education in Alberta which are considered to provide the prescribed boundaries for subject areas in the secondary school curriculum, are presented in Chapter II. Factors which influence the ease of acceptance and degree of emphasis accorded a particular subject area are also explained in the second chapter. The objectives of industrial arts in Alberta are then related to the general objectives of secondary education and the degree of compatibility between them is described.

Chapter III examines objectives of industrial arts education. The four programs which constituted the origin of industrial arts education are discussed and the particular characteristics of each is noted. The particular characteristics of industrial arts are determined from statements of contemporary authors. The assumption in Chapter III was that objectives of industrial arts could be categorized. Five categories are established from the particular characteristics of the four programs which constituted the origin of industrial arts and from the particular characteristics of industrial arts itself. Each of the industrial arts objectives stated for Alberta schools is categorized into one of the five categories and the body of subject matter inherent in each is determined. Lists of objectives considered representative of industrial arts in general are categorized and the suggested body of subject matter inherent in them is determined. The industrial arts objectives stated for Alberta schools are then compared with industrial arts objectives in general, and the degree of compatibility determined.

Programs of industrial arts are examined in Chapter IV. The particular characteristics of industrial arts determined in Chapter III are described more thoroughly and six criteria for the evaluation of industrial arts programs are developed. The program of industrial arts in Alberta is described and related to the program evaluative criteria. Programs of industrial arts in general are described and related to the criteria for program evaluation. The program in Alberta is then compared with industrial arts programs in general, and the degree of compatibility determined. An alternative program of industrial arts is

also described and evaluated in Chapter IV.[5]

The findings of Chapters III and IV are summarized in the concluding chapter. Chapter V interprets these findings and relates them to industrial arts objectives and programs in general, and to industrial arts objectives and programs in Alberta. Suggested research topics are also indicated in Chapter V.

---

[5] Henry R. Ziel, "A New Concept of the Industrial Arts Program," The ATA Magazine. 43:6 (February, 1963), pp. 17-21.

CHAPTER II

THE COMPATIBILITY OF INDUSTRIAL ARTS OBJECTIVES IN ALBERTA WITH THE GENERAL OBJECTIVES OF SECONDARY EDUCATION

Objectives of education, stated by a Department of Education and sanctioned by the political body responsible for education, serve many functions. One of these is to establish a basis or criterion against which the objectives of a given subject area in the secondary school curriculum may be judged. One of the purposes of this study is identical with this function of the objectives of secondary education; that is, to determine the degree of compatibility between the objectives of industrial arts and the general objectives of secondary education.

I. THE GENERAL OBJECTIVES OF SECONDARY EDUCATION

The general objectives of secondary education in Alberta were not critically analyzed or evaluated for the purposes of this study. No attempt was made to determine the degree of compatibility between the general objectives of secondary education in Alberta and recommendations from the literature. Because a purpose of this study was to examine the objectives of the single subject area of industrial arts, and not the general objectives of secondary education, an analysis of the latter objectives was considered unnecessary. Because the general objectives of secondary education do, however, influence the ease of acceptance and degree of emphasis accorded different subject areas in the curriculum, they require stating.

One of the factors which determines the ease of acceptance and the degree of emphasis accorded a given subject area in the curriculum is the compatibility between the general objectives of education and the objectives of the given subject area. There are, however, additional factors which influence the ease of acceptance and degree of emphasis which a given subject area receives. Inclusion of these factors makes possible a more objective and comprehensive approach to descriptive analysis of a given subject area. These factors are considered in their relation to the general objectives of secondary education; this permits an examination of the compatibility of industrial arts objectives and the general objectives of secondary education to be visualized in a broad perspective.

Functional objectives of the Alberta secondary schools. The general purposes of schools in Alberta are revealed in the objectives of secondary education which follow. The objectives of secondary education, referred to as functional objectives by the Department of Education, provide the framework within which each subject in the curriculum, as it strives to realize the general purposes of schools, must remain. The objectives are:

1. Personal Development

> The prime aim of the school is to assist each Alberta youth in his growth towards maximum self-realization. The following definite goals are included under this heading:
>
> i. Health and physical fitness.
> ii. Mental health.
> iii. Intellectual achievement.
>   a. Ability to think rationally, to express thought clearly and to read and listen with understanding.

   - b. A broad understanding of the methods of science, its major findings and its influence on human affairs.
   - c. A broad understanding of the fundamental principles of mathematics and their importance in daily living; a mastery of mathematical skills necessary for vocational competence.
   - d. An understanding and appreciation of cultural heritage.
- iv. The development of suitable recreational and leisure time activities.
- v. The development of character manifested in sound habits of behaviour in social relationships.
- vi. The development of a pattern of values, attitudes, and ethical ideals which furnish justification for good habits and culminate in a philosophy of life which recognizes the importance of religion.

2. Growth in Family Living

Each Alberta youth must learn to appreciate the unique and indispensable place in society played by the home and family and especially the influence of the family unit upon right thinking in connection with morals, institutions, and the current issues of democratic living. The school should assist him to achieve a better understanding and appreciation of:

- i. The responsibilities and privileges of the members of the family group.
- ii. The home as a democratic institution.
- iii. The conditions essential to successful family life.
- iv. The opportunities for enjoyment at home.
- v. The functions and responsibilities of parents.
- vi. The relationship of the family to its neighbours and the community.

3. Growth Toward Competence in Citizenship

Each Alberta youth must be brought gradually to a realization of his position and responsibilities in the school, community, province, nation, and finally in the community of nations. The school should guide him in:

- i. Acquiring insight into the historical background of contemporary society.
- ii. Developing competence in meeting, and attempting to solve, public problems and issues which citizens are required to encounter and on which they must take action.
- iii. Developing competence in political action at the school, community, national and world levels.

iv. Developing consumer competence.
v. Developing democratic attitudes and behaviour in all social situations.
vi. Establishing loyalty to the ideals of democracy and acquiring an appreciation of his community, the province and the nation.

4. Occupational Preparation

The school must help each Alberta youth to develop those understandings and attitudes that will make him an intelligent and productive participant in economic life; and assist him to develop saleable skills, or prepare for post-school vocational training. The youth should:

i. Become familiar with the range of vocational opportunities open to him.
ii. Learn how to take full advantage of the school and extra-school guidance services.
iii. Achieve an acceptance of his own capacities as indicated by professional analysis of interests, socio-economic status, aptitudes, personality, and native intelligence.[1]

The general objectives of secondary education stated above apply to each subject area in the junior and senior high school curriculums. Different subject areas attempt to achieve different objectives or different combinations of the general objectives of secondary education. The objectives of a given subject area must be compatible with the general objectives of secondary education if that subject area is to be accepted into the school curriculum. The degree of compatibility between the objectives of industrial arts and the general objectives of secondary education are determined following the consideration of five additional factors which also influence the ease of acceptance and degree of emphasis accorded a given subject area in the curriculum.

---

[1] Province of Alberta Department of Education, Curriculum Guide for Alberta Secondary Schools (Edmonton: Queen's Printer, 1950), pp. 15-17.

Factors Influencing Acceptance and Emphasis of a Subject Area.

Five factors which influence the ease of acceptance and degree of emphasis accorded a given subject area in the curriculum are considered here. The order in which they are presented is not indicative of their relative importance. In practice these factors are inter-related and their individual degree of influence changes according to different situations.

Specificity. The degree of specificity with which a subject area is indicated in the general objectives of education is an important factor in determining the ease of acceptance and degree of emphasis accorded that subject area in the curriculum. In this regard, both specificity and vagueness are evident in the general objectives of secondary education in Alberta.[2]

An examination of the functional objectives revealed that certain subject areas were stated specifically and others more generally. For example, subsections a, b, and c, section iii, of objective 1 specifically stated the definite purposes of language arts, science, and mathematics:

> a. Ability to think rationally, to express thought clearly and to read and listen with understanding.
> b. A broad understanding of the methods of science, its major findings and its influence on human affairs.
> c. A broad understanding of the fundamental principles of mathematics and their importance in daily living; a mastery of mathematical skills necessary for vocational competence.[3]

---

[2] Refer to pages 12 - 14.

[3] *Ibid.*, pages 15 - 16.

Thus we should expect to find, and in fact do find, definite subject areas in the curriculum for the express purpose of achieving these objectives. There is no need to justify the inclusion of these subject areas in the curriculum of secondary schools for the general objectives of secondary education spell them out. Curriculum workers will, of course, always need to revise and attempt to perfect these subject areas to reflect current thought and practice. But the acceptance of these subject areas is clear and definite, and will continue to be so as long as the general objectives of secondary education do not change. This is not the case for certain other subject areas included in the curriculum but not stated specifically in the general objectives of secondary education.

Subject areas not stated specifically in the general objectives of secondary education reveal in their stated objectives the particular body of subject matter upon which they draw. This body of subject matter constitutes the prescribed boundaries or point of emphasis of that subject area. Put another way, the objectives of a subject area not specifically stated in the general objectives of secondary education are required to make specific reference to the particular body of subject matter with which it is concerned, before its inclusion in the curriculum is justified. This specific reference to a particular body of subject matter is considered to be the point of emphasis in that subject area.

Philosophy of the school. Philosophy is interpreted to mean the general principles which underlie education. The second factor

which influences the ease of acceptance and degree of emphasis accorded a subject area in the curriculum is the set of general principles of education supported by a school. Each secondary school in the Province has a specific philosophy depending upon its interpretation of educational principles.

A school which evaluates its effectiveness in terms of numbers of students achieving university entrance requirements emphasizes those subject areas necessary to this criterion, and deemphasizes those subject areas not so necessary. Other schools which evaluate their effectiveness in terms of numbers of students gaining immediate entry into the labour force, emphasize those subject areas which develop saleable skills. All schools, in their attempts to realize the general objectives of secondary education, travel different routes and utilize different means because of their different philosophies. It is not intended to discuss the merits of each of the different philosophies, but rather to point out that the subject areas included in the curriculum and the methods used to achieve the purposes of developing each student to his unique potentiality and preparing him to be a democratic citizen, vary as do philosophical viewpoints.

Aspirations of society. The third factor which influences the ease of acceptance and degree of emphasis accorded a subject area in the curriculum is a persistent one. Major changes and developments in the community, province, nation, world and recently outer space, influence the subject areas which are selected and

emphasized in the schools. Because the school is accountable for the growth and development of the individual, societal changes and pressures which affect that growth are concerns of the school. Smith, Stanley and Shores express the relationship existing between the curriculum and the aspirations of society as follows: ". . .The curriculum is always, in every society, a reflection of what the people think, feel, believe, and do . . ."[4] Many recent curriculum developments exemplify the significance of this factor. Two of the more persistent demands on the school are (1) the increased emphasis on science and mathematics, both in content and rate, following the launching of the Russian satellites, and (2) the increased public pressure on the Department of Education to include a second language in curriculum at a much lower grade level than was heretofore considered necessary as an aid to the development of Canadian nationalism.[5]

Changes in the occupational structure. Much has been written about the accelerating rate of change in Canadian occupational requirements resulting from technological developments and increased industrialization.[6] Labour Acts now limit the age of entry of persons

---

[4] B. O. Smith, W. O. Stanley, and J. H. Shores, Fundamentals of Curriculum Development, (New York: World Book Co., 1957), p. 3.

[5] D. Cameron, Chairman, Report of the Royal Commission on Education in Alberta, (Edmonton: Queen's Printer, 1959), pp.124-126.

[6] J. R. Simonet, Chairman, Report of the Select Committee on Manpower Training. Ontario Legislative Assembly, February, 1963.

into the labour force, and persons currently entering the labour force require a higher educational level than was required a decade ago. Students now remain in school longer, some to prepare themselves better for the time when they do enter the labour force, and others to wait until they meet the age of entry. The increased and more diversified student population currently in secondary schools has resulted in attempts to provide for varying interests, needs and abilities by adding new subject areas to the secondary school curriculum and adapting existing ones. New changes in the Canadian occupational structure continue to influence the ease of acceptance and degree of emphasis accorded subject areas in the curriculum.

Distinction between the junior and senior high schools. The specific purposes of each of the two divisions of secondary education influence the ease of acceptance and degree of emphasis accorded subject areas in their curriculums. The objectives of a subject area might indicate a greater degree of compatibility with one or the other of the two divisions. For this reason, the functions of the junior high school are included below:

Functions of the Junior High School

1. To provide a setting in which the adolescent is understood and which makes possible a smooth transition from the elementary to the senior high schools.
2. To continue the training of the elementary school in basic skills and knowledge and to broaden this training to include more opportunities for students to think critically and to draw generalizations.
3. To provide for the mental, physical and aesthetic needs of students and to develop talents in these areas.

4. To provide opportunities for the development of acceptable social, moral, and spiritual values.
5. To help pupils discover special interests and abilities that will enable them to set realistic educational and vocationals goals.[7]

Summary

Five factors which appear to influence the ease of acceptance and degree of emphasis accorded a subject area in the curriculum have been presented. This rationale applies to all subject areas in the secondary school curriculum. In summary, the rationale was:

1. All subject areas in the secondary school curriculum must have objectives compatible with the general objectives of secondary education.

2. Subject areas stated specifically in the general objectives of secondary education have points of emphasis established and need not justify their acceptance into the curriculum.

3. Subject areas not specifically stated in the general objectives of secondary education must reveal in their stated objectives a particular body of subject matter which is their point of emphasis.

4. The ease of acceptance and degree of emphasis accorded a subject area in the curriculum appear to be influenced by:

   i. the philosophy of a school
   ii. the aspirations of society
   iii. the changing occupational structure
   iv. the degree of compatibility between the objectives of the subject area with those of one or other of the two divisions.

---

[7] Province of Alberta, Department of Education, Junior High School Handbook, (Edmonton: Queen's Printer, 1962), p. 4.

For the purposes of this study the rationale developed is applied only to the subject area of industrial arts. Application of this rationale to industrial arts requires that:

1. Industrial arts have objectives which are compatible with the general objectives of secondary education.

2. Industrial arts must justify its acceptance into the curriculum.

3. The objectives of industrial arts must indicate the particular body of subject matter upon which it draws. This is the point of emphasis of industrial arts.

4. The ease of acceptance and degree of emphasis accorded industrial arts appears to be influenced by:

    i. the philosophy of a school
    ii. the aspirations of society
    iii. the changing occupational structure
    iv. the degree of compatibility between the objectives of industrial arts and the functions of the junior and senior high school.

The remainder of this chapter is concerned with determining the degree of compatibility which exists between the industrial arts objectives and the general objectives of secondary education in Alberta. Chapter III determines the particular body of subject matter upon which industrial arts draws, thus revealing its point of emphasis.

II. OBJECTIVES OF THE ALBERTA INDUSTRIAL ARTS PROGRAM

Alberta has an abundance of stated objectives for its industrial

arts program. This abundance results from the method of program organization adopted by Alberta. The organization of the industrial arts program is examined in Chapter IV, but because the method of organization influenced the number and character of the objectives, certain terms require introduction and definition at this time. These terms are not new and their definitions explain the manner in which they are used in Alberta.

Industrial arts education is a subject area. An industrial arts course is a division of the subject area and is composed of a number of closely-allied activities from an industrial-technical area. As an example, metalworking is a course of industrial arts. A unit of industrial arts is a subdivision of a course and represents a branch of an industrial-technical area. As an example, forging, welding, sheet metalwork, and machine shop are included in the course of metalworking.

In Alberta specific objectives are stated for each unit and course, and objectives for the subject area. The objectives of the subject area provide the framework within which the specific unit and course objectives must remain. The compatibility between the objectives of industrial arts and the general objectives of secondary education can thus be determined by direct comparison. The industrial arts subject area objectives, although stated only in the junior high school curriculum guide, are intended to apply to the complete junior and senior high school industrial arts program. They are:

Objectives of the Alberta Industrial Arts Program

Attitudes

The experiences encountered in the Industrial Arts courses should tend to develop the following:

1. Cooperation - marked by consideration for the rights of others and willingness to contribute towards group experience.
2. Creativeness - marked by personal expression.
3. Scientific viewpoint - marked by the power to investigate problems, search for data, form conclusions and evaluate one's own judgment.
4. Social concern - marked by earnest effort to contribute towards desirable group ends.
5. Responsibility - marked by a sense of personal responsibility in carrying tasks to completion, and the acceptance of the consequences of one's own actions.
6. Self-respect - marked by personal control and cheerful compliance with measures designed to inculcate good character traits.
7. Reverence - marked by a conviction of Deity and a regard for His supreme handiwork - mankind.

Appreciations

Experiences should seek to emphasize the following:

1. The dignity and worth of the individual.
2. The dignity of honest labour, the significance of good craftmanship and the value of honest effort involved in the development of such craftmanship.
3. The importance of scientific and industrial developments.
4. The rich heritage of the Industrial Arts, marked by a general knowledge of the media used, the part they have played in the development of civilization and their contribution to the industrial, commercial and cultural life of today.
5. The significance of industrial developments as they affect our environment.
6. The opportunities provided through Industrial Arts experiences for creative expression.

Understandings

Experiences should assist the student to understand that:

1. The qualities of materials govern their suitability for specific purposes.
2. Methods of processing raw materials determine their usefulness for certain jobs.

3. Certain tools are designed to be used for specific purposes.
4. Organized thinking, careful planning and precise workmanship are necessary for good craftmanship.
5. "Safety Precautions" are necessary in order to protect the individual and the group.

Skills and Abilities

Experiences should develop the skill to:

1. Read and interpret drawings and blueprints.
2. Use drafting equipment.
3. Produce accurate plans, marked by good design.
4. Use with increasing proficiency the more common tools and machines employed in the modifying and handling of materials.
5. Make the computations and measurements essential to the planning and construction of projects.
6. Interpret and carry out technical instructions.
7. Condition the more common tools.[8]

The degree of compatibility between the subject area objectives of industrial arts and general objectives of secondary education can now be studied. Terms are considered compatible when they coexist in harmony, that is, when they are not irreconcilable.

Irreconcilability was not sufficient for the degree of accuracy desired here; the terms, therefore, were required to reveal a positive relationship to each other. This relationship was not determined by semantics or linguistic analysis, but by interpretation. Prior usage of the terms in the objectives, and the objectives taken in context, formed the basis of interpretation.[9] As an example of the process of inter-

---

[8] Province of Alberta, Department of Education, Junior High School Curriculum Guide, Industrial Arts Grades VII, VIII, IX. (Edmonton: mimeographed, 1954), pp. 2-3.

[9] In this respect, the validity of interpretation as a scientific method of determining meaning is explained in Israel Sheffler, The Language of Education, (Springfield, Illinois: Charles C. Thomas Publisher, 1960), pp. 3-59.

pretation used, a general objective of secondary education considered all subject areas in the curriculum to be concerned with the development of a sense of responsibility in students, and the subject area of industrial arts specifically stated the development of a sense of responsibility in students as an objective. On the basis of prior usage of the term 'responsibility' and the context in which the term appeared, these objectives were interpreted as having a positive relationship and therefore were considered compatible.

The method of organization of the general objectives of secondary education and the industrial arts objectives which follows illustrates those objectives which were interpreted as compatible. Each general objective of secondary education and industrial arts has been stated exactly as it appears in the quoted lists of objectives.[10] General objectives of secondary education which were interpreted as not revealing a positive relationship with an objective of industrial arts have been omitted. For purposes of clarity and continuity, the numbering of objectives has been omitted. In the table that follows, objectives placed opposite each other were interpreted as compatible.

---

[10] Curriculum Guide, op. cit., pp. 15-17.

TABLE I

OBJECTIVES OF INDUSTRIAL ARTS
INTERPRETED AS COMPATIBLE WITH THE GENERAL
OBJECTIVES OF SECONDARY EDUCATION IN ALBERTA

General Objectives of Secondary Education	Objectives of Industrial Arts
Personal Development	
The prime aim of the school is to assist each Alberta youth in his growth towards self-realization. The following definite goals are included under this heading:	
Health and physical fitness	"Safety Precautions" are necessary in order to protect the individual and the group.
Intellectual achievement Ability to think rationally, express thought clearly, and listen with understanding	Interpret and carry out technical instructions. Read and interpret drawings and blueprints.
A broad understanding of the methods of sciences, its major findings and its influence on human affairs.	Scientific viewpoint - marked by the power to investigate problems, search for data, form conclusions, and evaluate one's own judgment. The importance of scientific and industrial developments.
A broad understanding of the fundamental principles of mathematics and their importance in daily living; a mastery of mathematical skills necessary for vocational competence.	Make the computations and measurements essential to the planning and construction of projects.

TABLE I (continued)

General Objectives of Secondary Education	Objectives of Industrial Arts
An understanding and appreciation of cultural heritage.	The rich heritage of the industrial arts, marked by a general knowledge of the media used, the part they have played in the development of civilization and their contribution to the industrial, commercial and cultural life of today.
The development of character manifested in sound habits of behaviour in social relationships.	Cooperation - marked by consideration for the rights of others and willingness to contribute towards group experience. Self-respect - marked by personal and cheerful compliance with measures designed to inculcate good character traits. Social concern - marked by earnest effort to contribute towards desirable group ends.
The development of a pattern of values, attitudes, and ethical ideals, which furnish justification for good habits and culminate in a philosophy of life which recognizes the importance of religion.	Reverence - marked by a conviction of Deity and a regard for His supreme handiwork - mankind.
Growth Toward Competence in Citizenship	
Each Alberta youth must be brought gradually to a realization of his position and responsibilities in the school, community, province, nation, and finally in the community of nations. The school should guide him in:	Responsibility - marked by a sense of personal responsibility in carrying tasks to completion, and the acceptance of the consequences of one's own actions.

TABLE I (continued)

General Objectives of Secondary Education	Objectives of Industrial Arts
Acquiring insight into the historical background of contemporary society.	The significance of industrial developments as they affect our environment.
	The rich heritage of the industrial arts, marked by a general knowledge of the media used, the part they have played in the development of civilization and their contribution to the industrial, commercial and cultural life of today.
Developing democratic attitudes and behaviour in all social situations.	The dignity and worth of the individual.
	Social concern - marked by earnest effort to contribute towards desirable group ends.

Table I has indicated fourteen industrial arts objectives to be compatible with the general objectives of secondary education. The eleven objectives of industrial arts which were not included in Table I did not evidence positive relationships to the general objectives of secondary education. These eleven objectives were concerned with five topics, four of which were closely related. Three objectives related to skills, abilities and understandings of tools and machines. Two objectives related to qualities of materials. Two objectives related to the development of skills in drafting, and two related to the characteristics of good craftsmanship. The remaining two objectives related to the development of creative expression, an objective which was not included in the general objectives of secondary education, and yet could apply

to all subject areas in the curriculum.

Summary

In fourteen of the twenty-five industrial arts subject area objectives in Alberta a high degree of compatibility with the general objectives of secondary education was revealed. This proportion, slightly more than half, was interpreted to be not high.

The eleven industrial arts objectives which remained following the direct comparison in Table I need not necessarily be termed incompatible with the general objectives of secondary education. No objective of industrial arts was interpreted as indicating a definite conflict with any of the general objectives of secondary education.

The fact that only fourteen of the twenty-five industrial arts objectives indicated a positive relationship with the general objectives of secondary education was not considered as insufficient for a specific requirement. Rather, the fact was interpreted as supporting that portion of the rationale presented on pages 16 and 17 which suggested that subject areas not stated specifically in the general objectives of secondary education, such as industrial arts, are required to indicate in their objectives the particular body of subject matter upon which they draw. Perhaps the eleven remaining objectives of industrial arts perform such a function.

CHAPTER III

THE POINT OF EMPHASIS OF INDUSTRIAL ARTS

The rationale presented in Chapter II required that subject areas not specifically stated in the general objectives of secondary education must indicate in their objectives the definite body of subject matter upon which they draw. One purpose of this chapter is to determine the definite body of subject matter relevant to industrial arts objectives in Alberta. The body of subject matter which is determined is considered to illustrate the point of emphasis in industrial arts in Alberta.

A second purpose of this chapter is to determine the point of emphasis of industrial arts generally; that is, divorced from the emphasis assigned by a particular author, locale or period. The final purpose is to determine the degree of compatibility between the point of emphasis of industrial arts in Alberta and the points of emphasis of industrial arts generally.

Ascribing a point of emphasis which was general to industrial arts education involved a complex process. An explanation why this was attempted is necessary.

Given sufficient time and resources, almost every point of view in education can be substantiated with references from the literature. The converse is true as well. That is to say, lists of industrial arts objectives could have been selected which indicated a somewhat high degree of compatibility with the industrial arts objectives in Alberta, and lists of industrial arts objectives could also have been selected which indicated

a somewhat low degree of compatibility with the industrial arts objectives in Alberta. The purpose of this study was not to compare the points of emphasis of industrial arts in Alberta with the points of emphasis of a single list of industrial arts objectives. Furthermore, the purpose was not to formulate a list of industrial arts objectives for Alberta which incorporated points of emphasis common to lists of industrial arts objectives in the literature. The purpose was to determine the general points of emphasis of the subject area of industrial arts education.

In an attempt to achieve such a purpose, it was considered necessary to evolve a process which required the selection of representative lists of objectives and the categorization of objectives. The basis used for selection and categorization is explained below.

I. THE DEVELOPMENT OF INDUSTRIAL ARTS[1]

The subject area of industrial arts has had a comparatively short history. The literature generally agreed that four types of programs had influenced industrial arts theory and practice. Each of the four is discussed and its particular characteristics noted.

The Russian System of Technical Training

The Imperial Technical School in Moscow had a display of its practical technical training program at the Centennial Exposition of 1876 in Philadelphia. The impressive display resulted in the establishment of

---

[1] The information in this section is taken mainly from Delmar Olson, "Technology and Industrial Arts," (published Doctoral dissertation, Kent University, Columbus, Ohio), 1957, pp. 52-76.

a School of Mechanic Arts in Boston which followed the Russian training plan. The plan analyzed workshop operations into basic processes, arranged these in a graduated series, and made them the object of systematic drill by students. Separate shops were maintained for constructing projects and for instruction purposes. The purpose of the plan was to develop tool skills common to the basic trades and industries rather than to train tradesmen.

The Russian plan gave an effective and economical substitute for apprenticeship because increased numbers of students could learn skills from a master craftsman. The plan also placed mechanic arts on a pedagogical level by showing that these arts could be analyzed for their elements and then instruction given in them as easily as in mathematics, language, and other courses.

Educational Sloyd[2]

Sloyd, a program of handwork, originated in Germany and was developed in the Scandinavian countries. Boston elementary school teachers received instruction in educational sloyd about 1890. Sloyd, concerned with developing general skillfulness of the hand, was intended for general education purposes. Students made useful articles as projects and received individual instruction. Otto Solomon listed the following aims for educational sloyd:

---

[2] A more complete description of Sloyd is contained in Otto Solomon, "The Sloyd System," Selected Readings in Industrial Arts. (R. Miller and L. Smalley (eds), Bloomington, Illinois: McKnight and McKnight Publishing Co., 1963), pp. 37-44.

> . . . The first group are the formative aims and the second, the utilitarian.
>
> 1. To instil a taste for, and a love of, labour in general.
> 2. To instil respect for rough, honest, bodily labour.
> 3. To develop independence and self-reliance.
> 4. To train in habits of order, exactness, cleanliness, and neatness.
> 5. To train the eye and sense of form; to cultivate dexterity of hand and develop touch.
> 6. To cultivate habits of 'attention, industry, perserverance, and patience'.
> 7. To promote the development of the physical powers.
>
> The second group includes,
>
> 1. To directly give dexterity in the use of tools.
> 2. To execute exact work.[3]

The system of technical training from Russia and educational sloyd from Sweden constituted the basis for manual training, the American interpretation of educational shop-work.

Manual Training

Calvin M. Woodward, commonly referred to as the father of manual training, adopted the principles of the Russian system of technical training for the manual training program. He considered manual training to be an important part of general education, and placed emphasis on technical skills but for mental rather than trade competencies.

Manual Arts

Manual training was criticized as being too rigid, too formal, and lacking aesthetic design in its projects. Machine production was replacing hand methods in industry during this period. A Society of Arts

---

[3] Ibid., p. 42.

and Crafts incorporated in Boston in 1897, concerned with preserving the 'faculty of design', was instrumental in effecting a change in manual training. Creative and aesthetic considerations in designing and decorating projects became fundamental to shop work.

In manual arts, tool skills were considered as means to ends; the end being an acceptable project. Manual arts employed hand processes and materials in a craft relationship rather than drawing on industry for its source of tool processes. Bennett, referred to by Olson, considered manual arts to be responsible for giving instruction in the industries. He interpreted the manual arts which applied to industry as (a) the graphic arts, (b) the mechanic arts, (c) the plastic arts, (d) the textile arts, and (e) the book-making arts.[4]

The Russian system of technical training, educational sloyd, manual training, and manual arts are the foundations of industrial arts education. Their influences did not die out as succeeding programs took their place. For example, some of the principles of the Russian system of technical training are present in today's programs of manual training, manual arts, and industrial arts.

Industrial Arts Education

In 1904 Charles Richards focused attention on the fact that a change in philosophy as well as a change in name was required for educational shopwork. He suggested and interpreted the term "Industrial Arts"

---

[4] C. A. Bennett, The Manual Arts, (Peoria, Illinois: The Manual Arts Press, 1919), pp. 15-16.

as more representative of the scope of the desired subject matter area. He considered the term manual training vague and 'misleading as an indication of the aim and character of work'.[5] Richards recognized that a body of ideas of fundamental meaning and importance was the basis of every other subject in the curriculum, and, relating this to industrial arts, said:

> The whole matter would not be of such importance were it not for its bearing upon the nature and spirit of the work projected in the schools and its future trend. We are facing the question now as we devote our attention to miscellaneous and more or less meaningless projects, or whether we shall seek in an orderly way to develop an insight into the basic industries of our time and a knowledge of some of the steps through which these have reached their present form. A term like manual training tends to keep us at paper folding and chisel exercises. A term that indicated clearly a definite field of subject matter would do much to direct the line of advance, clear our minds and economize our efforts.[6]

Twenty years after Charles Richards proposed the term 'Industrial Arts', Frederick Bonsor and Lois Mossman established the purposes and indicated the content of this subject area when they formulated a definition of industrial arts. Their definition has been the most widely quoted definition in the history of industrial arts.[7]

> The industrial arts are those occupations by which changes are made in the forms of materials to increase their values for human usage. As a subject for educative purposes, industrial arts is a study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to these

---

[5] C. Richards, "A New Name," Selected Readings for Industrial Arts, (R. Miller and L. Smalley (eds.), Bloomington, Illinois: McKnight and McKnight Publishing Co., 1963), pp. 50-52.

[6] Ibid., p. 52.

[7] F. Bonsor and L. Mossman, Industrial Arts for Elementary Schools, (New York: The Macmillan Company, 1924), pp. 3-18.

changes.[8]

The amount of shopwork in the schools increased during the first three decades of the twentieth century. Distinctions in the practice of manual training, manual arts, and industrial arts became less. In 1933, an attempt to resolve the confusion resulted in a proposed definition by the Western Arts Association. This Association, conducting what was termed *A Terminological Investigation*, defined industrial arts as follows:

> Industrial arts is one of the Practical Arts, a form of general or non-vocational education, which provides learners with experience, understandings, and appreciations of materials, tools, processes, products and of the vocational conditions and requirements incident generally to the manufacturing and mechanical industries.[9]

Summary

Industrial arts had its origin in the Russian system of technical training, the Swedish system of educational sloyd, manual training, and manual arts. Following Richard's proposal of the term 'industrial arts', Bonsor and Mossman indicated the purposes and content of industrial arts. During the development of industrial arts confusion resulted as old concepts and practices were not discarded. The Terminological Investigation indicated industrial arts to be a form of general education which provided understandings of the manufacturing and mechanical industries - their materials, tools, processes and products.

Recent industrial arts educational literature contains references to the field of subject matter upon which industrial arts should draw.

---

[8] *Ibid*.

[9] Western Arts Association, *The Terminological Investigation*. (Indianapolis, Indiana: The Western Arts Association, 1933), p. 27.

These references, considered representative of current thinking, will now be examined.

II. CONTEMPORARY THOUGHT IN INDUSTRIAL ARTS EDUCATION

Recent literature contains statements indicating the definite body of subject matter from which industrial arts obtains its point of emphasis. Recent, in this context, refers to statements appearing in the literature within six years preceding this study. The six year period was selected arbitrarily. Available reference material was the prime criterion in selecting this time period as recent.

The statements selected are brief and the body of subject matter to which they refer is manifest; consequently, few descriptive comments are necessary to illustrate the body of subject matter which is indicated in the quotations which follow.

Micheels, in an essay which was published by the American Industrial Arts Association, indicated many purposes of industrial arts while referring to the body of subject matter upon which this subject area should draw:

> The industrial arts shop provides the school environment in which young people learn to work with tools, materials, and ideas. They learn to work together. They begin to understand something about industrial products and processes; they study the workings of an industrial society, they learn to make better use of the things they buy, and they develop their creative abilities in solving problems with tools and materials. They plan, experiment and construct; and in the process they are called upon to think, to organize, and to choose between alternatives.
>
> What is industrial arts in a modern school? It is different from the 'manual training' room with which many were familiar a generation ago.

> To begin with, 'industrial arts' is a collective term. It refers to many types of tools and materials, not merely to the woodworking hand tools and benches of the manual training era. The word industrial suggests learning experiences related to the processes, products, and problems of industry. The term 'arts' implies the creative potential in work with tools and materials of various kinds...[10]

The body of subject matter to which Micheels referred was that of industry. Students would learn about and experiment with materials, tools, products and processes of industry.

Hornbake made the following statements:

> . . . The acceptance of industrial arts into the family of school disciplines assumes that the world of work, particularly the phenomena of industry, constitutes a legitimate area of study. Can a person who lives in an industrial democracy lay claim to being an educated person if he has not become aware of the basic processes by which society maintains itself?
>
> . . . .
>
> . . . It is only as we are able to relate the world of work to education that industrial arts becomes a curriculum area worthy of consideration.[11]

Speaking a year later to members of the Industrial Arts Association in Ontario, Hornbake stated:

> Responsible behaviour in an industrial society requires every person, regardless of his occupation, to know something specific about the operation of industry.
>
> . . . In substance, our first social responsibility is to help our children and youth understand the world in which they live. Industry

---

[10] William J. Micheels, "Industrial Arts Education," The Three R's Plus, R. H. Beck (ed.), (Minneapolis: University of Minnesota Press, 1956), pp. 245-253.

[11] L. Hornbake, "Philosophical Viewpoints," American Council on Industrial Arts Teacher Education, A Sourcebook of Readings on Education. 6th Yearbook, (Bloomington, Illinois: McKnight & McKnight Publishing Co., 1957), pp. 14-15.

> is a very dominant element in this society. . . .[12]

In the above quotations, Hornbake seems to be expanding on the phenomenon of industry as the definite body of subject matter for industrial arts when he referred to 'the world of work'. Although he did not explain this phrase, by using it he left the impression that something more than a study of industry was necessary to interpret the productive aspects of our present society.

Hostetler and Young, professors of industrial arts at North Carolina State College, incorporated objectives of industrial arts in their reference to its body of subject matter. They stated:

> Today industrial arts is a subject area defined as dealing with the understanding and interpretation of industrial activity. As an important part of general education, industrial arts is concerned with materials, processes and products of industry. . . .[13]

Their interpretation of 'industrial activity' was explained more completely in the following paragraph:

> If we oversimplify the total task of education and agree that the central purpose of education is to enable the student to solve all of his problems (emotional, social, communicative, vocational, etc.) we would then say that the purpose of industrial arts is to provide experiences which will enable the student to solve the technical problems of living in a highly industrialized age. The experiences provided should give the student an opportunity to apply science, mathematics and other facets of his general education to the solution of practical problems in the industrial arts shop. _Industrial arts is the general education aspect of the industrial education complex_. It is general education in that it is not specialized. These experiences are not those which prepare for a trade or vocation, but are designed to familiarize the student not only with materials, processes, and tools of industry but also with industry as science and invention--as a means of producing goods and services--and as a unique pattern of human relationships. Industrial arts is designed to provide general orientation and basic skills and experiences which may become a basis for

---

[12] L. Hornbake, "Professional Growth in Industrial Arts Education," _Ontario Industrial Arts Bulletin_, December, 1958.

[13] I. Hostetler and T. B. Young, _A Guide to Curriculum Study - Industrial Arts._ (Raleigh, North Carolina: State Board of Education, 1959), p. 3.

> making vocational decisions and for further study in the industrial-technical complex.[14]

The body of subject matter which Hostetler and Young referred to was that of industry. They suggested that industry be studied in two additional ways: (1) 'as a means of producing goods and services', and (2) 'as a unique pattern of human relationships'. Perhaps this was what Hornbake envisioned when he referred to the 'world of work'.

Huggens, an industrialist from New Jersey, expressed industry's conception of the industrial arts body of subject matter in the following manner:

> . . . Industrial arts is that part of general education which provides a study of the industrial and technical aspects of our economy. It involves laboratory and research experiences in the organization, tools, materials, processes, and social problems of modern industry.[15]

The succinct definition of industrial arts by this non-educator included all of the components of industry expressed in previous statements.

Svendsen related the method of industrial arts to the source of its subject matter when he said:

> There is quite general agreement that industrial arts education as a curriculum area in general education is to concern itself with a study of industry. This statement broadly defines the source of the teaching content, but it is of little explicit help in spelling out the details of its task and its mission. Most educators, industrial and otherwise, have a confirmed feeling that this curriculum area is important and mandatory in a culture in which industry is so predominant. . . .
>
> . . . .
>
> Definitions of the area have always referred to the tools,

---

[14] Ibid., p. 11.

[15] S. D. Huggens, "Industry's View of Industrial Arts," Industrial Arts and Vocational Education, June, 1961, p. 17-18.

> materials, and processes of industry. This suggests in part the source of its content, but it also designates the keystones of its method. In enlightened practice it is difficult, if not impossible, to separate one from the other.[16]

Feirer is definite in statements concerned with objectives of industrial arts, and he indicates a definite body of subject matter upon which this subject area should draw. The industrial arts body of subject matter to which he refers is indicated in the following statements:

> It is said that science discovers the nature of man's world or universe and that technology uses these findings for man's benefit or destruction. It should be obvious to any thinking person that our school program should represent this area of technology and industry.
>
> . . . .
>
> Industrial arts is a study of the tools, materials, processes, products, and occupations of our industrial society.
>
> . . . .
>
> A good industrial arts program affords students an insight into American industry, the source of raw materials, how basic materials are processed, how products are designed and produced, and how people earn a living.[17]

Feirer would have industry and technology as the body of subject matter for industrial arts and, aware of the problems which this would entail, questions whether it is possible for industrial arts to interpret industry to youth. In an editorial which preceded the above statements by four

---

[16] E. A. T. Svendsen, Action and Thought in Industrial Arts Education. 12th Yearbook, American Council on Industrial Arts Teacher Education. (Bloomington, Illinois: McKnight & McKnight Publishing Co., 1963), pp. 12-13.

[17] J. L. Feirer, "Technology and Industry in Our Schools," Industrial Arts and Vocational Education, 50:5 (May, 1961), p. 48.

months, he questioned the possibility of achieving this objective, as follows:

> Are we interpreting industry to youth? In the great majority of cases the answer would have to be a flat "no". Is there any possibility of achieving this objective? The answer is "maybe", but first of all, we must discover if there are any common elements in any, some, or all industries that could be interpreted.[18]

The final two statements selected to indicate the definite field of subject matter of industrial arts were made by persons immediately responsible for industrial arts teacher training at the University of Alberta. In a study concerned with developing a method of selecting content for industrial arts, Stadt indicated the subject matter of industrial arts when he stated:

> . . . the role which industry plays in the lives we lead suggests the following educational objective:
>
> To create awareness of the hidden, subtle forces which are generated by industry and impinge (a) upon individuals and groups in the general population and (b) upon individuals and groups engaged directly or indirectly in the production of goods and services, and to lend intelligibility to those forces.[19]

Ziel made the following statements in connection with his proposed program of industrial arts:

> Let us observe industrial arts always as a synthesizing educational process in a multiple activity environment. The argument for multiple activity is predicated upon the fact that no profession or occupational title operates in a vacuum. The interrelationship of functions, processes, technologies are very evident in society. As a synthesizing educational environment introduced at the seventh grade level it can help reinforce the purposes of academic disciplines. This same environment at this early age introduces youngsters, boys and girls, to a

---

[18] J. L. Feirer, "Editors Note," Industrial Arts and Vocational Education, 50:1 (January, 1961), p. 11.

[19] R. W. Stadt, "A Method of Selecting Content for Lending Intelligibility to Industry: A Critique and a Proposal," (Unpublished Doctoral Dissertation, University of Illinois, Urbana, 1962), p. 103.

> variety of experiences that will interpret the current world of work so that they can make a more intelligible choice for the future.[20]

The views of Stadt and Ziel have indicated industry and the world of work as the basis of subject matter upon which industrial arts should draw.

Summary

A review of recent literature has indicated the definite sources of subject matter upon which industrial arts bases its point of emphasis. The source of subject matter is the world of work, with industry its salient component. Industrial processes, products, materials, and tools comprise a part of the understanding of industry. The organization and social problems of industry are also a part of the phenomenon of industry.

The points of emphasis of contemporary industrial arts thought, manual arts, manual training, educational sloyd and the Russian system of technical training, were presented in this and the preceding section of this chapter. The particular characteristics of these established the basis for categorizing lists of industrial arts objectives. The following section determines the point of emphasis of the industrial arts objectives in Alberta.

III. THE POINTS OF EMPHASIS OF INDUSTRIAL ARTS OBJECTIVES IN ALBERTA

Determining a point of emphasis inherent in a list of subject area objectives was not a simple process. The process required that reference

---

[20] H. R. Ziel, "A New Concept of the Industrial Arts Program," The A. T. A. Magazine, 43:6 (February, 1963), p. 18.

be made to something - something that was generally known and easily recognizable.

Lists of industrial arts objectives reveal their inherent points of emphasis when reference is made to the particular characteristics of earlier programs. The educational shopwork programs which preceded industrial arts have been identified and their particular characteristics noted. In review, they were educational sloyd, manual training and manual arts. The particular characteristics of each of these programs and of industrial arts constituted the area of reference employed in the analysis which follows.

Categories

The objectives of the industrial arts program in Alberta were interpreted and placed in one of five categories. The categories and their particular characteristics are:

General objectives of secondary education. Objectives of industrial arts which indicated a positive relationship or high degree of compatibility with the general objectives of secondary education in Alberta were placed in this category. As an example, an industrial arts objective such as 'developing the attitude of social concern - marked by earnest effort to contribute towards desirable group ends' was interpreted as having a positive relationship to the general objective of secondary education which stated 'the development of character manifested in sound habits of behaviour in social relationships', and was therefore placed in the general education category.

Industrial arts. Objectives of industrial arts which indicated a

positive relationship or high degree of compatibility with the particular characteristics of industrial arts were placed in this category. Referring to the second section of this chapter, these characteristics included the tools, materials, products, and processes of industry; the organization and social problems of industry; technology and other phenomenon of the world of work.

As an example, an industrial arts objective which referred to the understanding of industrial processes and methods was interpreted as compatible with the particular characteristics of industrial arts, and was therefore placed in the industrial arts category.

Manual arts. Objectives of industrial arts which indicated a positive relationship or high degree of compatibility with the particular characteristics of manual arts were placed in this category. These characteristics included creative and aesthetic experiences in designing and building projects. Hand processes and materials employed in a craft relationship were characteristic of manual arts. As an example, an industrial arts objective which referred to creative experiences in arts and crafts was interpreted as compatible with the characteristics of manual arts and was therefore placed in the manual arts category.

Manual training. Objectives of industrial arts which indicated a positive relationship or high degree of compatibility with the particular characteristics of manual training were placed in this category. They included reference to the trades and the qualities of good craftsmanship. Development of tool skills and prevocational training were emphasized in manual training. As an example, an industrial arts objective which

referred to the development of skills in the use of common tools and machines was interpreted as compatible with the particular characteristics of manual training, and was placed in the manual training category.

Educational sloyd. Objectives of industrial arts which indicated a positive relationship or high degree of compatibility with the particular characteristics of educational sloyd were placed in this category. Sloyd, characterized by the development of general skillfulness of the hand and a respect for work, was not concerned with industrial or trade training. As an example, an industrial arts objective which referred to 'the dignity of honest labour' was interpreted as compatible with the particular characteristics of educational sloyd, and was placed in the educational sloyd category.

Limitations of categories. There were two limitations to the system of categorizing objectives employed in this study. The first limitation was concerned with placing an objective that applied to more than one category. Some objectives were characteristic of two categories. As an example, an objective which referred to the construction of projects could have been placed in both the manual training and the manual arts categories because both of these programs emphasized project construction. In situations such as this, the criterion applied was that of 'particular characteristic'; that is, the construction of projects was an objective more 'particularly characteristic' of manual arts than it was of manual training. This objective was, therefore, placed in the manual arts category.

The second limitation related to an objective, part of which was

characteristic of one category and part of which was characteristic of a second category. As an example, an industrial arts objective such as 'Develop an interest in crafts as a valuable medium for creative expression in leisure time' was characteristic both of manual arts (interest in crafts, creative expression) and of the general objectives of secondary education (valuable medium for leisure time). In this situation, the components of the objective were placed in separate categories.

Method. The method employed in categorizing the objectives of industrial arts was identical with that used in determining the degree of compatibility between the objectives of industrial arts and the general objectives of secondary education in Chapter II. It was a method of interpretation, involving the prior usage of the terms in the objectives, and the context in which they appeared.

The points of emphasis inherent in the industrial arts objectives in Alberta are shown in Table II, page 48.

TABLE II

CATEGORIZATION OF INDUSTRIAL ARTS OBJECTIVES IN ALBERTA

General Objectives of Secondary Education

- Development of an attitude of cooperation - rights of others
- Development of an attitude of social concern
- Understanding of safety precautions
- Development of an attitude of personal responsibility
- Development of an attitude of self-respect
- Development of skill to read and interpret drawings
- Development of an attitude of reverence
- Appreciation of individual dignity and worth
- Development of an attitude of scientific viewpoint
- Development of skills in computation and measurement

Industrial Arts

- Appreciation of the importance of industrial developments
- Appreciation of the contribution of the industrial arts heritage to today

Manual Arts

- Development of skills in construction of projects
- Development of skills in good design
- Development of an attitude of creativeness - self-expression

Manual Training

- Development of technical skills
- Development of tool skills common to basic trades and industries
- Development of skill in conditioning common tools
- Understanding of the requirements for good craftsmanship
- Appreciation of good craftsmanship
- Development of skills in making drawings and blueprints
- Development of skills in using drafting equipment
- Development of skills in interpreting technical instructions
- Understanding of the processing and qualities of materials

Educational Sloyd

- Appreciation of the dignity of honest labour
- Understanding of precise workmanship

Most of the objectives of industrial arts placed in the category of the general objectives of secondary education do not indicate a particular body of subject matter. Those that do refer to a body of subject matter, refer to mathematics, science, or language arts. With these exceptions, general objectives of secondary education refer to many fields of subject matter, and comment on them is not pertinent to this analysis.

The manual training category in Table II, page 48, included nine objectives which relate to the definite body of subject matter in industrial arts in Alberta. Excluding objectives placed in the general objectives of secondary education category, this number was more than half of the objectives which direct the industrial arts program in Alberta. Three objectives were included in the manual arts category, one more than either the industrial arts or the educational sloyd categories, both of which had the same number.

Table II, page 48, illustrates the point of emphasis of the industrial arts objectives in Alberta to be that of manual training. It does not illustrate the point of emphasis to be industrial arts, educational sloyd, or manual arts although each of these receives minor emphasis.

IV. THE POINTS OF EMPHASIS OF OTHER LISTS OF INDUSTRIAL ARTS OBJECTIVES

The literature contains lists of industrial arts objectives. These were examined in an attempt to determine their points of emphasis.

The purpose of this examination was not to compare the points of emphasis of the industrial arts objectives in Alberta with the points of emphasis in other lists of objectives, nor was it to search for a list of industrial arts objectives which had points of emphasis similar to those in Alberta. The purpose, stated previously, was to determine the general points of emphasis inherent in lists of objectives which were selected as representative of the subject area of industrial arts education.

Selection of Lists of Objectives[21]

Three major approaches to the derivation of subject matter in industrial arts education have characterized the development of this subject area during the past fifty years. (see footnote 21). Lists of objectives representative of each of the major approaches were considered representative of the subject area of industrial arts education for the purposes of this study. Lists of objectives from the trade and job analysis approach, the behavioral change approach, and the industrial categories approach provided the means for finding the points of emphasis

---

[21] R. W. Stadt, *op. cit*. The procedure used here to select lists of objectives representing different approaches to industrial arts education was similar to that used by Stadt. Stadt examined "contemporary aims and corresponding methods of content selection in industrial arts education in the light of McMurray's definition of the unique function of the formal school. . . ." His selection of lists of objectives was presented in "approximate order of significance as attested by the number of actual programs which have been designed through their use and by the number of people in industrial arts education who advocate their use. . . ."

Stadt determined three major approaches representative of industrial arts. The same approaches and his terminology were used in this study, although the number of lists of objectives supporting each approach was not as complete.

that were general to industrial arts education.

Method of Categorization

Selected lists of industrial arts objectives were interpreted and placed in categories. The categories were identical with those used in classifying the industrial arts objectives in Alberta and the same criteria for placement apply here. The method used for determining the meaning of the objectives was identical with that used in determining the degree of compatibility between the objectives of industrial arts and the general objectives of secondary education; that is, a method of interpretation, involving the prior use of the terms in the objectives, and the context in which they appeared.

Trade and Job Analysis Objectives

Lists of industrial arts objectives developed by Friese, Ericson, and Giachino and Gallington were considered representative of the first major approach to industrial arts education.[22] Each list of objectives, stated separately, is categorized in Table III, page 54. This table indicates the points of emphasis of each author and the combined points of emphasis of the three authors. The combined points of emphasis are considered indicative of the points of emphasis in industrial arts by

---

[22] R. W. Stadt, *op. cit.* Lists of objectives by Friese, Giachino and Gallington, and Newkirk and Johnson were selected as representing the Trade and Job Analysis approach. Because the industrial arts teacher training program in Alberta has involved study of Ericson's work, his objectives have been substituted for Newkirk and Johnson's.

advocates of the trade and job analysis approach.

Friese listed the following aims for industrial arts:

> To provide 'general vocational industrial education (for degrees of versatility) in a family of trades, if equipment is adequate.
> To provide shop training in technical curriculums.
> To provide limited training in industrial service jobs, if equipment is adequate.
> To provide creative experiences in art-crafts for vocational as well as avocational purposes.
> To keep academically slow students interested.[23]

Ericson listed the following ten objectives of industrial arts as 'Desired Goals' of industrial arts:

1. Self-discovery by the pupil of his own abilities and aptitudes, leading toward maturing life interests.

2. Satisfying experience in self-expression through creative effort leading to material accomplishments.

3. Understanding of industry and methods of production, and of the influence of industrial products and services upon the pattern of modern social and economic life.

4. Appreciation of good design and good workmanship in their application to construction and to manufactured products.

5. Judgment and resourcefulness in selection, purchase, use and care of industrial products and services both in the home and occupational life.

6. Ability to use tools and materials leading to household maintenance, leisure-time pursuits, and, in some degree, to basic occupational skills.

7. Ability to read and made sketches and drawings used for illustrative and construction purposes, including the ability to read graphic and technical illustrations in books and magazines.

8. Development of maturing work habits, feeling of responsibility and ability to plan and execute work alone and in cooperation with others.

9. Basic experience in the use of tools, machines, and materials of value in carrying on future educational and professional work on

---

[23] J. F. Friese, Course Making in Industrial Education. (Peoria, Illinois: Chas. A. Bennett Co., Inc., 1946), p. 102.

scientific and technological levels.

10. Development of safety habits and fundamental safety consciousness not only in the school but in the home and in future occupational life.[24]

Giachino and Gallington translated their philosophy into more specific terms with the following objectives of industrial arts:

1. Provide experience in correctly performing operations involving basic industrial hand tools and common machines.
2. Acquaint the students with the various fields of industry, including the materials, products, and employment opportunities.
3. Develop desirable work habits and ability to work cooperatively.
4. Develop safety habits with industrial hand tools and machines.
5. Stimulate an interest in hobbies.
6. Develop an appreciation of good craftsmanship.
7. Provide opportunities to satisfy creative desires.
8. Develop the ability to think rationally, to plan shopwork wisely, execute plans effectively, and appraise finished products intelligently.
9. Develop the ability to select and use wisely the products of industry.
10. Develop ability to perform common household repairs.
11. Develop a basic understanding of labour-management-consumer relationships in an industrial society.[25]

Each of the objectives of Friese, Ericson, and Giachino and Gallington was interpreted and placed in the appropriate category in Table III, page 54.

---

[24] E. E. Ericson, Teaching the Industrial Arts. (Peoria, Illinois: The Manual Arts Press, 1946), p. 250.

[25] J. W. Giachino and R. O. Gallington, Course Construction in Industrial Arts and Vocational Education. (Chicago: American Technical Society, 1954), p. 53.

TABLE III

CATEGORIZATION OF TRADE AND JOB ANALYSIS OBJECTIVES OF INDUSTRIAL ARTS

	Friese	Ericson	Giachino and Gallington
General Objectives of Secondary Education			
Cooperative attitude		x	x
Social concern		x	
Safety and health		x	x
Personal responsibility		x	
Ability to read and interpret drawings		x	
Habits of orderly performance			x
Self-realization	x	x	
Avocational-recreational	x	x	x
Industrial Arts			
Understanding of industry		x	x
Methods of industrial production		x	
Consumer education - industrial		x	x
Products of industry			x
Exploration of industrial occupations			x
Organization of industry			x
Manual Arts			
Experiences in arts-crafts	x		
Appreciation of good design		x	
Creativeness - self expression	x	x	x
Manual Training			
Exploration of trades	x		
Emphasis of technical skills	x		
Prevocational training in industrial service jobs	x		
Develop tool skills common to basic trades and industries	x	x	x
Make drawings and blueprints		x	
Appreciation of good craftsmanship		x	x
Processing and qualities of materials		x	x
Household mechanics - handyman		x	x
Correlation with other subjects		x	
Educational Sloyd			

The objectives placed in the general objectives of secondary education category of Table III do not indicate a particular body of subject matter and therefore no comment related to them is required.

Nine objectives related to the particular characteristics of the manual training program; six related to the industrial arts program; and three related to the manual arts program. Two objectives were expressed by each of the authors; (1) creativeness-self-expression, and (2) the development of tool skills common to the basic trades and industries.

Table III, page 54, indicated the point of emphasis revealed in the objectives of the trade and job analysis approach to industrial arts education to be that characteristic of manual training. The point of emphasis related to the characteristics of industrial arts was considerable. When the point of emphasis related to the characteristics of manual arts was taken in combination with the industrial arts point of emphasis, they equalled the emphasis on manual training. No association with the particular characteristics of educational sloyd was evident in the objectives of Friese, Ericson, and Giachino and Gallington.

Behavioral Change Objectives

Lists of industrial arts objectives developed by the Industrial Arts Policy and Planning Committee of the American Vocational Association and Wilber were considered representative of the behavioral change approach to industrial arts education. Each list of objectives is stated separately and categorized in Table IV, page 58. This table indicates the points of emphasis of each list of objectives and the combined points of emphasis of the two lists. The combined points of

emphasis are considered indicative of the points of emphasis in industrial arts by advocates of the behavioral change approach.

The Industrial Arts Policy and Planning Committee stated the following 'suggested objectives for industrial arts':

1. Interest in Industry. To develop in each pupil an active interest in industrial life and in the methods and problems of production and exchange.

2. Appreciation and Use. To develop in each pupil the appreciation of good design and workmanship and the ability to select, care for, and use industrial products wisely.

3. Self-realization and Initiative. To develop in each pupil the habits of self-reliance and resourcefulness in meeting practical situations.

4. Cooperative Attitudes. To develop in each pupil a readiness to assist others and to join happily in group undertakings.

5. Health and Safety. To develop in each pupil desirable attitudes and practices with respect to health and safety.

6. Interest in Achievement. To develop in each pupil a feeling of pride in his ability to do useful things and to develop worthy leisure-time interests.

7. Orderly Performance. To develop in each pupil the habit of an orderly, complete, and efficient performance of any task.

8. Drawing and Design. To develop in each pupil an understanding of drawings and the ability to express ideas by means of drawing.

9. Shop Skills and Knowledge. To develop in each pupil a measure of skill in the use of common tools and machines and an understanding of the problems involved in common types of construction and repair.[26]

---

[26] American Vocational Association, A Guide to Improving Instruction in Industrial Arts, A Bulletin Prepared by the Industrial Arts Policy and Planning Committee (Washington: American Vocational Association, 1953), p.18.

The Department of Education in Alberta indicated the significance of these objectives when it stated in the Junior High School Curriculum Guide for Industrial Arts (under the heading of Standard Reference) "Every instructor should have the American Vocational Association booklet 'A Guide To Improving Instruction in Industrial Arts'."

Gordon O. Wilber considered that objectives for industrial arts should result from a deliberation on the objectives for general education. In 1948 he developed the following list of objectives for industrial arts:

1. To explore industry and American industrial civilization in terms of its organization, raw materials, processes and operations, products, and occupations.
2. To develop recreational and avocational activities in the area of constructive work.
3. To increase an appreciation for good craftsmanship and design, both in the products of modern industry and in artifacts from the material cultures of the past.
4. To increase consumer knowledges to a point where students can select, buy, use, and maintain the products of industry intelligently.
5. To provide information about, and - in so far as possible - experiences in, the basic processes of many industries, in order that students may be more competent to choose a future vocation.
6. To encourage creative expression in terms of industrial materials.
7. To develop desirable social relationships, such as cooperation, tolerance, leadership and followership, and tact.
8. To develop safe working practices.
9. To develop a certain amount of skill in a number of basic industrial processes.[27]

Each of the objectives of the Industrial Arts Policy and Planning Committee and of Wilber was interpreted and placed in the appropriate category of Table IV, page 58.

In Table IV, page 58, ten objectives related to the particular characteristics of industrial arts, five related to the characteristics

---

[27] G. O. Wilber, Industrial Arts in General Education. (Scranton, Pennsylvania: International Testbook Company, 1948), pp. 42-43.

TABLE IV

CATEGORIZATION OF BEHAVIORAL CHANGE APPROACH OBJECTIVES OF INDUSTRIAL ARTS

	Policy Committee	Wilber
General Objectives of Secondary Education		
Cooperative attitude - rights of others	x	x
Social concern - contribution to group	x	x
Safety and health	x	x
Self-respect	x	
Ability to read and interpret drawings	x	
Habits of orderly performance	x	
Self-realization	x	x
Avocational-recreational	x	x
Industrial Arts		
Contribution of the industrial arts heritage		x
Understanding of industry	x	x
Methods of industrial production	x	
Consumer education in industrial products	x	x
Products of industry	x	x
Processes of industry		x
Exploration of industrial occupations		x
Skill in industrial processes		x
Organization of industry	x	x
Pattern of human relationships in industry	x	
Manual Arts		
Appreciation of good design	x	x
Creativeness - self-expression		x
Manual Training		
Appreciation of good craftsmanship	x	x
Develop tool skills common to basic trades	x	
Make drawings and blueprints	x	
Processing and qualities of materials		x
Household mechanics - handyman		x
Educational Sloyd		

of manual training; and two related to the characteristics of manual arts. These two lists of objectives for industrial arts were quite similar. The degree of emphasis which each list of objectives related to the particular characteristics of industrial arts, manual training, and manual arts was very nearly equal.

Table IV, page 58, indicated the point of emphasis revealed in the objectives of the behavioral change approach to industrial arts education to be that characteristic of industrial arts. This approach allotted some measure of emphasis to the characteristics of manual training and a slight degree of emphasis to the characteristics of manual arts, but when combined they did not equal the degree of emphasis assigned to the characteristics of industrial arts. No evidence of the particular characteristics of educational sloyd was revealed in the industrial arts objectives of Wilber and the Industrial Arts Policy and Planning Committee.

Industrial Categories Objectives

The industrial categories approach to industrial arts was originally developed by William E. Warner and his colleagues at Columbus, Ohio, and presented to a convention of the American Industrial Arts Association in 1947. Delmar Olson, while a student at Ohio in 1957, refined and expanded Warner's original approach. The functions of industrial arts listed below, considered representative of the industrial categories approach to industrial arts education, are those of Olson:

> The functions of industrial arts are statements of the purposes for which industrial arts is intended and to which it is assigned: they together become its mission. They represent a crystallization of the aims, objectives, and goals of industrial arts. . . .
>
> The Orientation Function. Experiences in industrial arts should help the junior and senior high school pupil become better oriented in an industrial society by exploring many types of tools, materials, processes, products, and occupations. Manipulation should be primarily a means for promoting other ends. Habits and skills derive their value from appropriate use. The emphasis is rather upon obtaining a pattern of knowledge, attitudes, habits, skills, and understandings essential to individual and group welfare in a technological society. One of the basic outcomes of the orientation function is its value in assisting the pupil in making an occupational choice which may lead him into vocational preparation in the final years of his educational program.
>
> The Technical Function. Industrial arts should provide as many opportunities as possible for pupils to spend at least a year in any phase of work where orientation may help to define specialized interests that can be pursued with profit. . . .
>
> The Avocational Function. Industrial arts also provides opportunities to cultivate a wide variety of useful, wholesome, and enduring leisure time, interests, and activities. Collection and appreciation is involved in addition to manipulation. . . .
>
> The Consumer Function. A primary purpose of industrial arts is to aid the individual in developing intelligent attitudes and understanding concerning the selection and use of the products of industry. This involves studies and experiences covering a variety of topics and problems ranging from the production of raw materials, through the processes and problems involved in their manufacture, to the distribution of finished products and their wise use by the ultimate consumer. . . .
>
> The Social Function. Experiences in industrial arts through activities in the shop or laboratory, as well as outside, should help the students develop desirable social habits and attitudes. . . .
>
> The Cultural Function. Experiences in industrial arts should help the individual enjoy a finer culture as regards materials in an involved technological society. This means helping him develop and use his material inheritance. For example, the pupil can learn to know style or design in architecture. . . .[28]

---

[28] D. Olson, op. cit., pp. 77-78.

Olson's functions of industrial arts were interpreted and placed in the appropriate categories of Table V, page 62.

In Table V, page 62, eight objectives of the industrial categories approach related to the particular characteristics of industrial arts; two related to manual training, and one related to manual arts. Table V, page 62 indicated the point of emphasis revealed in the objectives of the industrial categories approach to industrial arts education to be those characteristic of industrial arts. Slight emphasis was placed on manual training and manual arts characteristics, but the large degree of emphasis related to the characteristics of industrial arts.

The findings of Tables II, III, IV, and V have been combined in one table. This table should reveal the general points of emphasis of industrial arts objectives divorced from approaches to industrial arts, individual authors, geographical areas and different periods in its development. This table should also permit a comparison between the general points of emphasis of industrial arts objectives and the points of emphasis of the industrial arts objectives in Alberta.

In an attempt to attain completeness, industrial arts objectives placed in the category of general objectives of secondary education are included in Table VI, page 63. Although these objectives do not indicate a particular body of subject matter for industrial arts education, their inclusion makes possible a more complete comparison.

TABLE V

CATEGORIZATION OF INDUSTRIAL CATEGORIES
OBJECTIVES OF INDUSTRIAL ARTS

General Objectives of Secondary Education

- Cooperative attitude - rights of others
- Social concern - contribution to group
- Self-realization
- Avocational - recreational

Industrial Arts

- Contribution of industrial arts heritage to today
- Understanding of industry
- Consumer education in industrial services and products
- Products of industry
- Processes of industry
- Exploration of industrial occupations
- Skill in industrial processes
- Organization of industry

Manual Arts

- Appreciation of good design

Manual Training

- Processing and qualities of materials
- Household mechanics - handyman

Educational Sloyd

TABLE VI

CATEGORIZATION OF INDUSTRIAL ARTS OBJECTIVES IN ALBERTA AND THOSE OF REPRESENTATIVE APPROACHES

	Alberta	Trade and Job Analysis	Behavioral Change	Industrial Categories
General Objectives of Secondary Education				
Cooperative attitude - rights of others	x	x	x	x
Social concern - contribution to group	x	x	x	x
Safety and health	x	x	x	
Personal responsibility	x	x		
Self-respect	x		x	
Ability to read and interpret drawings	x	x	x	
Reverence	x			
Appreciation of individual dignity and worth	x			
Scientific viewpoint	x			
Habits of orderly performance	x	x	x	
Skill in computation and measurement	x			
Self-realization		x	x	x
Avocational-recreational		x	x	x
Industrial Arts				
History of industrial developments	x			
Contribution of industrial arts heritage	x		x	x
Understanding of industry		x	x	x
Methods of industrial production		x	x	
Consumer education - industrial products		x	x	x
Products of industry		x	x	x
Processes of industry			x	x
Exploration of industrial occupations		x	x	x
Skill in industrial processes			x	x
Organization of industry		x	x	x
Pattern of human-relationships in industry			x	
Manual Arts				
Construction of projects	x			
Appreciation of good design	x	x	x	x
Creativeness - self-expression	x	x	x	
Experiences in arts and crafts		x		

TABLE VI (continued)

	Alberta	Trade and Job Analysis	Behavioral Change	Industrial Categories
Manual Training				
Emphasis of technical skills	x	x		
Exploration of trades		x		
Pre-vocational training industrial svc. jobs		x		
Develop tool skills common to basic trades	x	x	x	
Skill in use of drafting equipment	x			
Make drawings and blueprints	x	x	x	
Skill in conditioning common tools	x			
Requirements of good craftsmanship	x			
Appreciation of good craftsmanship	x	x	x	
Interpret and carry out technical instructions	x			
Household mechanics - handyman		x	x	x
Processing and qualities of materials	x	x	x	x
Correlation with other subjects		x		
Educational Sloyd				
The dignity of honest labour	x			
To execute exact work	x			

V. A COMPARISON BETWEEN POINTS OF EMPHASIS IN INDUSTRIAL ARTS OBJECTIVES IN ALBERTA AND THE GENERAL POINTS OF EMPHASIS IN INDUSTRIAL ARTS OBJECTIVES

The synthesis of industrial arts objectives which constitutes Table VI, page 63, presents in the form of a summary all of the industrial arts objectives which have been categorized in this study. The purpose of such a summary was to compare in general terms the points of emphasis of the industrial arts objectives in Alberta with the points of emphasis of industrial arts objectives. The discussion which follows relates to the information contained in Table VI, page 63. Comments applicable to industrial arts objectives in Alberta follow a critique of industrial arts objectives in general.

Critique of Industrial Arts Objectives in General

A state of confusion, relating to the distinctions between the terms manual training, manual arts and industrial arts, existed prior to 1933.[29] The distinction between the three terms is now clear. Confusion remains, however, in regard to the particular body of subject matter inherent in industrial arts objectives. Certain trends were evident from the preceding analysis, and these deserve comment.

Related to general objectives of secondary education. The relative number of industrial arts objectives which reflected the particular characteristics of the general objectives of secondary education seemed to be decreasing. All lists of industrial arts objectives studied had

---

[29] Refer to page 36.

objectives related positively to the general objectives of secondary education. The literature had frequent references to industrial arts being a part of general education. Proponents of the behavioral change approach, in particular, formulated objectives illustrating the positive relationship between industrial arts and general education. On the other hand, objectives of the industrial categories approach, although not negating the importance of industrial arts as a part of general education, placed less emphasis on this relationship. In reference to this relationship, Selvidge deplored the fact that industrial arts was hiding behind the blind of general education. He commented "When that is the only justification we can give for a subject, it is dead and should be decently interred."[30] Feirer suggested that industrial arts must offer "something that is distinct, different, important, and significant to the education of every boy",[31] or else it would fail. Referring to industrial arts objectives, he said:

> Our major objective must make distinct contribution to general education. We shouldn't stress the same general objectives that could be applied equally well to social studies, physical education, home economics, art, or any other subject area. It's not enough to say that we can teach cooperation, leadership, self-reliance, etc., better than social studies can, for example.[32]

---

[30] R. W. Selvidge, "Discussion," Journal of Proceedings and Addresses of the National Education Association for 1912. (Washington: National Education Association, 1912), p. 948.

[31] J. L. Feirer, "Let's Take the Offensive," Industrial Arts and Vocational Education, XLIX:6 (June, 1960), p. 13.

[32] Ibid.

The trend of fewer objectives of industrial arts relating positively to the characteristics of the general objectives of secondary education was interpreted as an indication of less need to justify industrial arts as a part of general education, and more need for industrial arts objectives to indicate the particular body of subject matter upon which it draws.

Related to objectives characteristic of industrial arts. The complement of the trend visible in the preceding paragraph, that is, an increased number of industrial arts objectives which indicated the particular characteristics of industrial arts, was evident in the analysis of objectives. As our knowledge of the world of work and the phenomenon of industry grows, an increased number of objectives could be expected to be placed in the industrial arts category. The impact of technology and automation on the world of work will no doubt be reflected in future lists of industrial arts objectives.

Related to objectives characteristic of manual arts. The number of industrial arts objectives which indicated the particular characteristics of manual arts did not change. This was interpreted as an indication that creativity or self-expression, and appreciation of good design, both of which were particularly characteristic of manual arts, are equally applicable to the current world of work and the phenomenon of industry.

Related to objectives characteristic of manual training. The number of industrial arts objectives which revealed the particular characteristics of manual training has decreased. However, two objectives of manual training have remained: (1) the processing and

qualities of materials, and (2) the use of skills in household mechanics. This was interpreted as an indication that these two objectives, both of which were particularly characteristic of manual training, are equally applicable to the current world of work and the phenomenon of industry.

The principles of the Russian system of technical training which constituted the basis for the objectives of manual training reflected an industrial society dominated by the apprenticeable trades and crafts. The manual training objectives may have adequately mirrored that society in the early part of the twentieth century. The use of these same objectives to reflect the type of industrial society present today seems inadequate because of the changes which have taken place in all phases of industry during the past sixty years.[33]

Related to objectives characteristic of educational sloyd. In general, objectives of industrial arts did not reflect the particular characteristics of educational sloyd. This was interpreted as an indication that the particular characteristics of sloyd, which reflected an agrarian society utilizing hand tool operations, do not interpret the current world of work.

---

[33] Many publications discuss the accelerating rate of change because of increased use of technology and automation in industry. In particular, see: Education For A Changing World of Work, A Report of the Panel of Consultants on Vocational Education requested by the President of the United States, OE Pub.No.80020 (Washington: U.S. Government Printing Office, 1962); A. V. Piggot, "Education and Employment," A Study prepared for the Canadian Conference on Education, 1962, (Ottawa: Dominion Bureau of Statistics, 1961); Acquisition of Skills, No.4 in the Reports Issued by the Interdepartmental Skilled Manpower Training Research Committee (Ottawa: Queen's Printer, 1960); Preparing Pupils For The World Of Work, A Report Prepared by a Special Staff Committee (Detroit: The Board of Education of the City of Detroit, 1962).

Common Points of Emphasis in Industrial Arts Objectives

Twelve objectives of industrial arts were common to each of the major approaches to industrial arts education, that is, to industrial arts, generally. Five of the common objectives related to the particular characteristics of industrial arts, four to general objectives of secondary education, two to manual training, and one to manual arts.

The twelve objectives which were found to constitute the points of emphasis in industrial arts generally were:

1. cooperative attitude - rights of others
2. social concern - contribution to group
3. self-realization
4. avocational - recreational
5. understanding of industry
6. consumer education
7. products of industry
8. exploration of industrial occupations
9. organization of industry
10. appreciation of good design
11. household mechanics - handyman
12. processing and qualities of materials

A statement indicating the purpose of industrial arts which incorporated these twelve objectives would include the points of emphasis of industrial arts common to the three major approaches to industrial arts education.

Critique of the Industrial Arts Objectives in Alberta

A comparison between industrial arts objectives in Alberta and industrial arts objectives, generally, disclosed their degree of compatibility.

Related to general objectives of secondary education. Alberta had more objectives of industrial arts which related to the particular characteristics of the general objectives of secondary education than did any of the three other major approaches. Two of these objectives were the same as two of the objectives which were common to each of the major approaches to industrial arts education. The other two objectives which were common to each of the major approaches but which were not included in industrial arts objectives in Alberta were the avocational-recreational and self-realization objectives. The omission of these two objectives was interpreted as an indication that determining students' likes and dislikes, special aptitudes and limitations, and providing experiences which assisted in the development of worthy leisure time activities, were not considered important objectives of industrial arts education in Alberta.

The abundance of industrial arts objectives which related to the particular characteristics of the general objectives of secondary education was interpreted as an indication that the Department of Education in Alberta believed justification of industrial arts was necessary; that is, industrial arts was not yet readily accepted in the secondary education curriculum.

Related to objectives characteristic of industrial arts. Alberta had two industrial arts objectives which indicated the particular characteristics of industrial arts. Both of these objectives related to an historical study of industrial developments. The two objectives did not indicate that the intent of this subject area was to study the current world of work and the phenomenon of industry. The lack of industrial arts objectives which related to the particular characteristics of industrial arts, consequently, was interpreted as an indication that this subject area would not develop in youth an understanding of the current world of work and the phenomenon of industry.

Related to objectives characteristic of manual arts. The objectives of industrial arts in Alberta which indicated the particular characteristics of manual arts were in general similar in number and kind to those included in industrial arts objectives. This was interpreted as indicating a high degree of compatibility with those industrial arts objectives in general which related to the particular characteristics of manual arts.

Related to objectives characteristic of manual training. The particular characteristics of manual training constituted the point of emphasis in industrial arts objectives in Alberta. The emphasis in Alberta on the characteristics of manual training was equal to that of the trade and job analysis approach to industrial arts education. Manual training objectives do not reflect the world of work of 1960.[34] Alberta's

---

[34] Refer to page 68.

positive relationship to the particular characteristics of manual training was interpreted as an indication that industrial arts objectives in Alberta were not related to the world of work which currently exists.

Related to objectives characteristic of educational sloyd. The fact that the objectives of industrial arts in Alberta included characteristics particular to educational sloyd and objectives of industrial arts in general did not, was interpreted as a further indication that objectives in Alberta were not related to the world of work which currently exists.

Summary and Conclusions.

The four programs of educational shopwork that influenced the origin of industrial arts education were explained in this chapter. The particular characteristics of each of these programs and of contemporary thought in industrial arts constituted the basis for categorizing industrial arts objectives.

Industrial arts objectives in Alberta were categorized and the points of emphasis determined. Additional lists of industrial arts objectives, representative of the three major approaches to industrial arts, were also categorized, and the points of emphasis of industrial arts in general were determined. The points of emphasis in Alberta and the points of emphasis of industrial arts in general were compared.

Industrial arts objectives in general were found to be in a state of confusion; that is, the particular body of subject matter which industrial arts objectives indicated was not consistent. Certain trends were

evident, however, and these were interpreted.

Industrial arts objectives in Alberta were found to indicate a particular body of subject matter which was not compatible with that expressed by contemporary authors. The body of subject matter inherent in industrial arts objectives in Alberta was found to be that of manual training. Limited emphasis was placed on the characteristics of industrial arts. The particular characteristics of educational sloyd, in vogue prior to 1900, received the same degree of emphasis as did the characteristics of industrial arts.

CHAPTER IV

PROGRAMS OF INDUSTRIAL ARTS

If the general objectives of secondary education establish the boundaries within which subject area objectives must remain, then subject area objectives establish the boundaries within which programs must remain. This chapter explains and analyzes programs of industrial arts, specifically the program in Alberta, programs suggested by proponents of the trade and job analysis, the behavioral change, and the industrial categories approaches, and a program proposed by Ziel.

I. RATIONALE

Definition of Terms

The terms subject area, course, and unit were defined on pages 21 and 22. Additional terms, necessary for a discussion of the arrangement of industrial arts subject matter, require definition at this time.

Program. Subject areas in the curriculum have their bodies of subject matter organized into programs. For the purposes of this study, program was defined as the manner of the arrangement of industrial arts subject matter; it was not the subject matter itself.

Unit Shop. A unit shop is designed and equipped to provide instruction in one industrial arts course. As an example, a woodwork unit shop is designed to provide instruction in woodwork; instruction in other courses such as electricity or metalwork would not be provided

in a woodwork unit shop.

General Shop. A general shop is designed and equipped to provide instruction in two or more industrial arts courses. As an example, instruction in woodwork, metalwork, plastics, and electricity could be provided in one general shop. One instructor is usually responsible for instruction in the multiple-activity general shop.

Unit shop and general shop have been defined with reference to use in Alberta. Some authors used terms other than unit and general to describe types of shops. For example, the literature referred to a unit shop as a type of shop designed and equipped to provide instruction in only one unit of a course. That is, a cabinet-making unit shop would not provide instruction in other units of woodwork. When such a narrow meaning was applied to the term unit shop, the term limited general was applied to the type of shop design in which equipment and instruction was provided for a combination of units within a course. As an example, cabinetmaking, framing, wood turning, and wood finishing, could comprise units within a woodworking limited general shop. The term comprehensive general shop was used in the literature and had the same meaning as the term general shop. To achieve consistency and to enable comparison, only the terms unit shop and general shop were used in this study to describe the different types of shops designed and equipped for instruction in industrial arts programs.

Vocational course. The literature referred to some industrial arts courses as vocational courses. The distinction between vocational courses and industrial arts courses was not a clear and definite one in

the literature. Some authors stated that no clear distinction could be made.[1] Wenrich, writing in the Encyclopedia of Educational Research, expressed the distinction between the two in the following manner:

> Vocational education should not be confused with the practical arts; the former is specialized education, while the latter is general education. The distinguishing feature is the purpose: the purpose of a vocational education course or curriculum is to prepare the student for employment or progression in a specific occupation; the practical arts courses are designed for the purpose of broadening the general education of children, youth, and adults. For example, vocational-industrial education is designed to prepare the learner for employment in industry or to advance in the industrial occupation in which he is already employed; industrial arts is designed to educate boys and girls (and men and women) to live more effectively in a world which is influenced by industry and technology. . . .[2]

The above definition of vocational courses was accepted for this study. When this definition was applied to the secondary school level, therefore, vocational courses were defined as those specialized courses which were intended to prepare students for employment in a specific occupation.

Process and Purpose of Analysis

A descriptive analysis of programs of industrial arts requires that they be interpreted and referred to an established frame of reference. This frame of reference, the particular characteristics of industrial arts education, was established in the preceding chapter. It

---

[1] V. C. Fryklund, Trade and Job Analysis. (Milwaukee: Bruce Publishing Co., 1947), J. F. Friese, Course Making In Industrial Education. (Peoria, Illinois: Chas. A. Bennett Co., 1958).

[2] R. C. Wenrich, "Vocational Education," Encyclopedia of Educational Research. 3rd ed. Chester W. Harris (ed.). (New York: The Macmillan Company, 1960), p. 1556.

requires additional description at this time, so that the criteria for program analysis can be more readily understandable.

The analysis in the previous chapter showed the subject area objectives of industrial arts in general to be confused and inconsistent. The analysis to be reported here, therefore, compared programs of industrial arts not with reference to objectives, but with reference to the particular characteristics of industrial arts.

In review, the particular characteristics of industrial arts, determined in Chapter III, were:

1. industrial arts is a part of general education,
2. the body of subject matter of industrial arts is the world of work with industry its salient component; this includes;
    a. the contribution of industrial developments to today's world,
    b. an understanding of industry, its methods of production, processes, and products,
    c. an exploration of industrial occupations,
    d. the development of skills in industrial processes,
    e. an understanding of the organization and the pattern of human-relationships in industry.

A more thorough and exact description of the particular characteristics of industrial arts is necessary. That is, to say that industrial arts is a part of general education without knowing what is meant by the term general education would be of little value. Similarly, to state that the subject matter of industrial arts is the world of work,

would connote insignificant meaning unless the world of work to which it relates is known. The difficulty of the task of determining the meaning of the terms general education and the world of work is compounded by the fact that there are many conceptions of what they are.

To formulate a statement of the meaning of these terms (if consensus could be determined) would have demanded research beyond the scope of this study. It was not considered necessary for the purposes of this study to present an exhaustive description of general education or of the world of work, and no attempt was made to do so.

The purposes of this study required only that the meaning of general education as it was used in Alberta and, specifically, the requirements necessary for the program of industrial arts to be a part of general education be determined. Similarly, for the purposes of this study, an enumeration of the industrial classifications in which the largest numbers of persons were employed, were considered sufficient representation of the world of work in Alberta and Canada.

Determining the meaning of the term general education as it is used in Alberta, and the major industries in Alberta and Canada is the first task faced in this chapter. The second purpose of this chapter is to describe and interpret the industrial arts program in Alberta in relation to the particular characteristics of industrial arts. The third purpose is to describe and interpret programs of industrial arts that are representative of the three major approaches to industrial arts education. The fourth purpose is to compare the program of industrial arts in Alberta with representative programs. Finally, the

industrial arts program developed by Henry R. Ziel will be described, interpreted, and related to the particular characteristics of industrial arts.

This analysis should perform four functions: (1) it should indicate the degree of compatibility between the industrial arts program in Alberta and the particular characteristics of industrial arts, (2) it should indicate the degree of compatibility between industrial arts programs in general, and the particular characteristics of industrial arts, (3) it should indicate the degree of compatibility between the industrial arts program in Alberta and industrial arts programs in general, and (4) it should indicate a program of industrial arts compatible with the particular characteristics of industrial arts.

The Meaning of General Education in Alberta

The Department of Education in Alberta has not defined the term general education. Although publications of the Department frequently refer to general education, the constituent parts of general education have not been presented. The meaning of the term as it was used in Alberta, therefore, was inferred from less specific statements which discussed education in general.[3]

With reference to general school organization, the Department

---

[3] In this regard, it is recognized that definitions of general education could be obtained from the literature. Selecting definitions of general education at random would be grossly unfair to the divergence of opinion connected with such a broad topic as this. Therefore, although, the process of inferring the meaning of general education as it is used in Alberta may result in a less specific meaning of the term, such a process was adopted here.

stated:

> The school should be organized to meet the needs of all educable youth until they are eighteen years of age. This means that the secondary school should make a determined effort to provide both for the academically-minded student preparing for university entrance, and for the much larger group who, though intending to go into farming, business, or industry, would nevertheless profit from several additional years of schooling. Matriculation requirements must not hinder the development of a curriculum sufficiently flexible to provide for the needs of non-matriculants.[4]

The Department indicated that the principle of twelve years of formal schooling may seem extreme and idealistic.[5] It also indicated that "The organization of the curriculum should be accomplished in harmony with the functional objectives of secondary education. . ."[6] The Department continued with an evaluation of the effectiveness of the high school program and suggested a solution for its improvement in the following statement:

> . . . We have weakened our high school in recent years in endeavouring to force all into the severe academic pattern of university matriculation. As a matter of fact the young people who leave high school in such numbers cannot be retained until they are provided courses consistent with their interests and ambitions. If we believe that there is value in retaining these young people in the schools for a year or two longer, whether for vocational, cultural or economic advantage, or for improvement in quality of citizenship, we must provide the variety of offerings which a multi-track program alone possesses.[7]

Exception is taken with the statement that a multi-track program alone provides a variety of offerings. A broad fields curriculum designed to

---

[4] Province of Alberta, Curriculum Guide for Alberta Secondary Schools, Department of Education (Edmonton: 1950), p. 20.

[5] Ibid.

[6] Ibid.

[7] Ibid., p. 21.

provide exploration in diverse interests and needs would also provide a variety of offerings. Good defined this type of curriculum organization as:

> curriculum, broad fields: a curriculum built around a small number of major areas of study that are constant for all pupils; represents a reaction to the provision of a multiplicity of separate subjects as the answer to individual needs and interests.[8]

Pursuance of this exception is not intended here, but a multi-track program does have significance when it means that a single subject area in the curriculum is sub-divided into separate courses at one grade level. When this division takes place, each of the courses resulting from the subdivision no longer reflects an entire body of subject matter. The courses become a number of segments, each containing only a portion of the body of subject matter within that subject area.

The quotations cited from publications of the Department of Education made no specific interpretation of general education. Certain inferences, however, can be made. First, the schools should attempt to meet the needs of all educable youth for twelve years, and second, the curriculum should be accomplished in harmony with the functional objectives of secondary education. The specific subject areas of a general education curriculum are not indicated, but it would appear from these statements that a subject area which claims to be a part of general education must meet certain requirements. The subject area of industrial arts shows a positive relationship to general education. The following statements reveal this relationship and also indicate the difficulties

---

[8] C. V. Good, Dictionary of Education. (Toronto: McGraw-Hill Publishing Co., 1959), p. 113.

in classifying some of the courses as general or specialized education.

> At the junior high schools levels, industrial arts is a part of general education. In the senior high schools, specialization and vocational education enter the picture. The courses designated as general mechanics are intended for general education, but it is difficult to know whether woodwork, metalwork, and automotives, etc., should be classified as general or vocational education. Such categorization depends both on what a student's purposes are in taking such courses and on what use, vocational or otherwise, he later makes of the skills and knowledge he acquires in the courses. For the purposes of this article, however, all Grade X technical courses are being arbitrarily classified as part of general education. There are two reasons for this classification:
>
> 1. . . .although many boys (and a very few girls) register for such courses in Grade X, the number of such registrations at the Grades XI and XII levels is very small . . .
>
> 2. Grade X-level courses are rated at four or five credits only, and can be neatly included in a general or academic program. But most courses at Grades XI and XII levels are for eight to ten and even fifteen credits. Thus when a student chooses even one such course, he has almost automatically prevented himself from taking a matriculation program, at least. Courses of eight or more credits are, therefore, classified as vocational while those of four or five credits are counted as general. . .[9]

The question of whether industrial arts at the senior high school level is general education or vocational education was considered by the Division of Industrial Arts, Department of Education in Alberta, in 1957:

> . . . One area of interest is the high school shop program - is it a vocational program or is it industrial arts? This is a question that is being asked all over North America. The answer appears to be "industrial arts with a vocational flavour" or "vocational for some and general for others" or "is there really a difference at the high school level".[10]

---

[9] "The Split Personality of Technical Education," Curriculum News Letter. No. 10, (Alberta General Curriculum Committee, Oct. 1958), p. 5.

[10] Department of Education, Newsletter to Industrial Arts Teachers, (Edmonton: mimeographed, September, 1957), p. 1.

The problem was identified in the above statement, but no solution was proposed. However, five years later, the same office left no doubt regarding the place of industrial arts in education, when it stated:

> Industrial arts is instructional shopwork which provides for all youth sound educational experiences that contribute to the satisfaction of their purposes, needs and wants.
>
> It is an integral part of the general education program of all youth. It offers those learning experiences which assist boys and girls to understand the industrial and technical aspects of life today. It is a curriculum area that makes a realistic contribution to life adjustment education. It shares with other areas of the school the responsibility for promoting the optimum development of the good citizen.
>
> . . . .
>
> Industrial arts is organized on a basis as representative of modern industry as is possible within practical limits. The program embraces such areas as woods, metals, graphic arts, automotives, electricity, leather, plastics, and ceramics with general drawing and planning included in all of them. These areas should not be regarded as separate subjects but as areas of experience and segments of the total program.[11]

Statements have indicated that industrial arts is considered to be a part of general education. Industrial arts, therefore, must attempt to achieve the following features of what are interpreted to be the requirements of general education:

(1) Industrial arts is in harmony with the functional objectives of secondary education. This relationship was presented and analyzed in Chapter II.

(2) All Alberta youth must have access to the program of industrial arts.

---

[11] Department of Education, Newsletter to Industrial Arts Teachers, (Edmonton: mimeographed, Summer, 1962), p. 1.

(3) A program of industrial arts is one of a variety of offerings which constitute a general education program.

The first feature of general education was considered in the chapter on objectives and need not be repeated here. The third feature does not provide a basis for comparison. That is, a program of industrial arts could include a variety of courses or it could be one course and be only one of a variety of offerings which constitute an overall program of general education.

The second feature was considered applicable to the analysis of the industrial arts program in Alberta, and constitutes part of the criteria to which the program is related; that is, all Alberta youth must have access to the industrial arts program, a program in which "areas should not be regarded as separate subjects but as areas of experiences and segments of the total program."[12]

The Major Industrial Classifications in Alberta and Canada

It was determined in Chapter III that a particular characteristic of industrial arts education is that it represents the world of work, with industry as its salient component. The major industrial classifications in Alberta and Canada were considered representative of the world of work for the purposes of this study.

The Dominion Bureau of Statistics classified Canada's labour force into industrial categories. Industries in which over 50,000

---

[12] Refer to footnote 11, Chapter IV.

persons were employed were arbitrarily considered major Canadian industries for the purposes of this study; in Alberta, the figure was set at 5,000 persons. Tables VII and VIII do not indicate occupational classifications; they indicate industrial classifications. Many occupational classifications would be found in each of the industrial classifications. See Appendix A for a more complete classification of persons employed in the labour force in Canada and Alberta under the industrial classification shown in Tables VII and VIII.

TABLE VII

MAJOR INDUSTRIAL CLASSIFICATIONS IN CANADA[13]

Labour Force, 15 years of age and over, by industry, for Canada, 1961.	
Retail trade	701,606
Agriculture	640,786
Personal services	437,518
Construction	431,093
Transportation	385,031
Health and welfare	307,433
Wholesale trade	289,884
Federal administration	284,953
Education and related services	266,901
Food and beverage industries	219,185
Communication	130,074
Local administration	123,789
Mines, quarries, oilwells	121,702
Transportation equipment industries	118,021
Insurance and real estate industries	117,969
Financial institutions	110,936
Forestry	108,580
Metal fabricating industries	103,216
Paper and allied industries	101,640
Services to business management	98,987
Wood industries	98,871
Clothing industries	91,928
Primary metal industries	90,156
Electrical products industries	84,924
Printing, publishing and allied industries	84,265
Electric power, gas and water utilities	70,504
Chemical and chemical products	69,510
Provincial administration	68,761
Textile industries	62,252
Miscellaneous service industries	59,556
Religious organizations	53,130
Miscellaneous manufacturing industries	50,813

---

[13] Dominion Bureau of Statistics, Labour Force Industries By Sex. 1961 Census of Canada, (Catalogue: 94-518, Vol: III - Part 2), Ottawa: Queen's Printer, 1963), p. 1A-1.

The major industries in Alberta, as determined by the number of persons employed, are indicated in Table VIII.

TABLE VIII

MAJOR INDUSTRIAL CLASSIFICATIONS IN ALBERTA[14]

Labour Force, 15 years of age and over, by industry for Alberta, 1961.	
Agriculture	103,573
Retail trade	52,613
Construction industries	37,360
Personal services	30,861
Transportation	29,985
Wholesale trade	27,483
Health and welfare services	23,270
Education and related services	20,984
Federal administration	20,895
Finance, insurance, real estate	14,695
Food and beverage industries	13,317
Local administration	10,796
Communication	9,582
Services incidental to mining	9,280
Services to business management	7,185
Mineral fuels	7,165
Provincial administration	6,859

Tables VII and VIII indicate that the major industries in Alberta are almost identical with the major industries in Canada. Eleven of the twelve major industries in Alberta are the same as the twelve major industries in Canada.

It is evident from Tables VII and VIII that the world of work in

---

[14] Ibid., pp. 1-1 to 1-12.

Alberta and Canada is more than the production of products in agriculture, construction, food, mining, and fuels. It is also the production of services in trade, administration, transportation, finance, and communication.

It would appear that a program of industrial arts which would represent the world of work, therefore, must indicate that it is concerned with developing understandings about the production of goods and services in the major industries of Alberta and Canada.

The particular characteristics of industrial arts have now been clarified. For the analysis to be reported in this study, they constitute the frame of reference within which programs of industrial arts must remain, and to which programs are related. In summary, the criteria are:

(1) The industrial arts program is so designed that all Alberta youth have access to it.

(2) The industrial arts program interprets the world of work, with the major industries in Alberta and Canada as its salient component.

a. the industrial arts program develops understandings and provides experiences in the methods of production, the processes and the products relevant to and resulting from the major industries in Alberta and Canada.

b. the industrial arts program explores occupations relevant to the major industries in Alberta and Canada.

c. the industrial arts program develops skills in the industrial processes relevant to the major industries in Alberta and Canada.

d. the industrial arts program develops understandings of the

organization and patterns of human-relationships relevant to the major industries in Alberta and Canada.

II. THE PROGRAM OF INDUSTRIAL ARTS IN ALBERTA

The industrial arts program in Alberta is divided into four levels. Each of the levels is described in detail later, but briefly they are:

Level I: The first level is an exploratory one suggested for grades 7, 8, and 9 and is conducted in general shops. It consists of six constant units and six elective units.

Level II: The second level is an orientation one recommended for grade 10 and is conducted in unit shops. It consists of seven courses each having a number of units.

Level III: The third level is a combined exploratory and vocational level suggested for grades 10, 11, and 12 and is conducted in either general shops or unit shops. It consists of eight courses, each having a number of units. This level is predominant in town and rural areas.

Level IV: The fourth level is a vocational one recommended for grades 11 and 12 and is conducted in unit shops. It consists of fourteen vocational courses each having a number of units.

Level I

The junior high school program is recommended for all youth. It is "a suitable and desirable exploratory course for girls. If it is possible for the girls to be grouped together the elective phases [courses] of leather, plastics, and art metal should be emphasized."[15]

The grade seven industrial arts program is a constant program. It includes drafting, woodwork, and metalwork. In grade eight, drafting and woodwork continue and an option of either metalwork, plastics, art metal, or leather, or a combination of two of these is added. Drafting continues in grade nine and is supplemented with either two, three, or four electives from woodwork, metalwork, electricity, plastics, leather and art metal. The typical program[16] suggested for Level I is:

	Grade 7	Grade 8	Grade 9
8 weeks	Drafting^{c}	Drafting^{c}	Drafting^{c}
8 weeks	Woodwork^{c}	Woodwork^{c}	Woodwork^{E}
8 weeks	Woodwork^{c}	Woodwork^{c}	Woodwork^{E}
8 weeks	Metalwork^{c}	Plastics^{E}	Electricity^{E}
8 weeks	Metalwork^{c}	Art Metal^{E}	Leather^{E}

c: constant
E: elective

One or two of either metalwork, plastics, and art metal can be substituted for woodwork in the typical grade nine program. This

---

[15] Province of Alberta, Department of Education, Junior High School Curriculum Guide; Industrial Arts, Grades 7, 8, 9. (Edmonton: mimeographed, 1954), p. 15.

[16] Ibid., pp. 6-7.

substitution results in a greater depth study of these courses but does not introduce new courses to the student.

Although drafting, woodwork, metalwork, electricity, plastics, art metal, and leather receive recognition and emphasis in the junior high school program, other courses can be included:

> There are other legitimate phases of industrial arts work, viz: Radio, Graphic Arts, Automotives, Ceramics, Textile, Home Mechanics, which are not suggested in this bulletin. Instructors wishing to offer optional units in any of these phases may do so. They are asked to request approval...for these innovations.[17]

Level II

The grade ten courses which constitute this level are unit shop courses. Senior high school courses in Alberta are classified as constants and electives, and a specified number of 'credits' is awarded for the successful completion of each course. The variety of courses available to senior high school students and the regulations restricting 'credit load' result in most students following senior high school patterns which are similar in constant courses but diverse in elective courses. The fact that the elective subject area of industrial arts is further divided into eight courses in Level II means that it is impossible for senior high school students to take the complete industrial arts program--they can take only segments of the total industrial arts program. Unit shop courses at this level, therefore, are not available to all Alberta youth.

Woodwork, metalwork, electricity, automotives, printing, arts and

---

[17] *Ibid.*, p. 15.

crafts, agriculture,[18] and drafting are the industrial arts unit shop courses in Level II. Each of these courses is made up of units. As an example, the metalwork course is made up of units in machine shop, sheet metal, bench work, shaping metals, and heat treating.

A unit on drafting is included in each of the Level II unit shop courses with the exception of arts and crafts, and printing; that is, unit shop courses in woodwork, metalwork, electricity, agriculture, and automotives recommend that twenty percent of the course time be allotted to related drafting.

Level III

The industrial arts program at this level is applicable mainly to town and rural high schools. Students in grades 10, 11, and 12 may enroll in this level. There are two parts to Level III, each of which is classified according to its particular type of shop organization.

General shop organization. General Mechanics 15, 16, and 17 are offered in the one-instructor general shop. Ordinarily, a grade ten student enrolls in General Mechanics 15, a grade eleven student enrolls in General Mechanics 16, and a grade twelve student enrolls in General Mechanics 17. These three courses are, in fact, one course which is divided into five sub-courses, each having related units. The total general mechanics program consists of the following courses and units:

---

[18] The Department of Education does not have curriculum guides for Agriculture 10, 20, 21, and 30. These courses are, however, included in the senior high school program. Because they follow the same number sequence and have the same prerequisite requirements as senior high school woodwork, electricity, metalwork, and automotives, they are interpreted and analyzed in the same manner.

The Course Units[19]

Woodwork:	Unit 1	Bench Woodwork (Emphasis - Hand Tools)
	Unit 2	Furniture Construction (Emphasis - Power Tools)
	Unit 3	Advanced Furniture Construction
	Unit 4	Elementary Carpentry
	Unit 5	Building Construction
	Unit 6	Home Renovations and Improvements
Metalwork:	Unit 7	Sheet Metalwork
	Unit 8	Forging
	Unit 9	Welding
	Unit 10	Machine Shop
Electricity:	Unit 11	Introduction to Code and House Wiring
	Unit 12	Electric Appliances and Motors
	Unit 13	Elementary Radio
Automotives:	Unit 14	Vehicle Maintenance
	Unit 15	The Electrical System
	Unit 16	Motor Repair
	Unit 17	Motor Tune-up
Others:	Unit 18	Concrete and Plumbing
	Unit 19	Farm Machine - Maintenance and Repair
	Unit 20	Farm Power Units

---

[19] Province of Alberta, Department of Education, Curriculum Guide - General Mechanics 15-16-17. (interim edition, Edmonton: mimeographed, 1955), p. 20.

The twenty units stated above constitute the method of organizing the body of subject matter included in General Mechanics 15, 16, and 17. The arrangement of the units into the three courses is flexible. Methods, suggested by the Department of Education, of organizing the units into the three courses, are, first:

General Mechanics 15 Grade 10	General Mechanics 16 Grade 11	General Mechanics 17 Grade 12
Bench woodwork	Elementary carpentry	Advanced furniture const.
Furniture construction	Frame construction	Home renovations
Sheet metal work	Code and house wiring	Motor repair
Forging	Electric appliances and motors	Motor tune-up

and second:

Bench woodwork	Elementary carpentry	Advanced furniture const.
Furniture construction	Frame construction	Home renovations
Forging	Vehicle maintenance	Concrete and plumbing
Welding	Electrical system	Farm machine maintenance and repair

Although drafting is not stated as a unit in the General Mechanics outline, it is considered an integral part of each course. "It is recommended that from 10% to 20% of the course time be allotted to drafting. The drafting must be carefully integrated with the course outline."[20]

The General Mechanics program serves a dual function. It provides exploratory experiences in woodwork, metalwork, electricity, automotives and drafting. Depending upon the sequence of units selected, the General Mechanics program also permits a depth study of one or more of these courses.

---

[20] *Ibid.*, p. 16.

The courses included in the General Mechanics program closely resemble those included in the unit shop organization of Level II. Printing, and arts and crafts, both of which are unit shop courses in Level II, are not included in the General Mechanics program. With this exception, the two programs are analogous to one another. The organization of the General Mechanics program, however, permits experiences in all of the five major courses in the program. Selection of courses is not required by students, and therefore all youth can, hypothetically, participate in the complete General Mechanics program.

Unit shop organization. The second part of Level III includes unit shop courses that are offered in town or rural general shops. This at first appears to be in contradiction with the unit and general types of shop design. In practice, however, some general shops have sufficient accommodation and equipment necessary for one or two unit shops, and consequently, instruction in some unit shop courses is available to some rural high school students.

The courses are second-year senior high school industrial arts courses requiring prerequisites. They include woodwork, metalwork, electricity, automotives, and agriculture. Woodwork is the only course which does not require the corresponding Level II course as a prerequisite; it requires either the corresponding Level II course or General Mechanics 15 as a prerequisite.

Curriculum guides are not issued for these courses. Direction is provided, however, by the Department of Education:

> The instructor is to select lecture and project material which was not covered in the [Level II] course.
>
> The instructor is to select the material from Level II which was not taught in the prerequisite course. Additional work as determined by the shop equipment and students' best interests should be selected from [Level IV] course.[21]

Level IV

The grade eleven and twelve courses which constitute this level are unit shop courses. They require the corresponding courses as prerequisites. Level IV courses include woodwork, metalwork, electricity, automotives, drafting, arts and crafts, and agriculture. They are not intended to be exploratory or a part of general education; they are designated as vocational courses.

Summary of Courses

The four levels which have been described constitute the program of industrial arts in Alberta. To facilitate analysis, the program must be perceived in its entirety, not in its constituent parts. Table IX attempts to achieve this purpose. The total number of courses included in the industrial arts program in Alberta is shown in this table. Some units of courses are also included. As an example, the unit on plastics is included. This elective unit in Level I, although not a course as defined, introduces a new body of subject matter into the industrial arts program. Table IX illustrates the total number of industrial material areas included in the program, as well as an indication of those courses which receive major emphasis.

---

[21] Province of Alberta, Department of Education, Curriculum Guide - Metalwork 10-21-20-30. (interim edition, Edmonton: mimeographed, 1955), p. 21.

TABLE IX

COURSES INCLUDED IN THE
INDUSTRIAL ARTS PROGRAM IN ALBERTA

Courses and/or Units	Level I	Level II	Level III		Level IV
			General	Unit	
Drafting	x	x	x	x	x
Woodwork	x	x	x	x	x
Metalwork	x	x	x	x	x
Electricity	x	x	x	x	x
Automotives		x	x	x	x
Printing		x			x
Arts and Crafts		x			x
Agriculture		x			x
Plastics	x				
Leather	x				
Art metal	x				
Concrete and plumbing			x		
Farm machinery			x		

Table IX illustrates that drafting receives the most emphasis in the program of industrial arts in Alberta. It is compulsory in Level I, a course of specialization in Levels II, III, and IV, and a required part of all courses in Levels II, III, and IV, with the exception of arts and crafts, and printing. Woodwork receives slightly less emphasis than drafting; it is not compulsory in grade nine. Metalwork and electricity receive equivalent emphasis, both slightly less than woodwork. Automotives is included both in unit shops at Levels II, III, and IV, and in the General Mechanics course, and therefore is interpreted as receiving emphasis in the industrial arts program. The five

courses of drafting, woodwork, metalwork, electricity, and automotives receive major emphasis in the program of industrial arts in Alberta.

Printing, arts and crafts, and agriculture receive considerable emphasis at the senior high school level. Concrete and plumbing, farm machinery, plastics, leather, and art metal are units within courses, and, therefore, are interpreted as receiving least emphasis in the industrial arts program.

The explanation of the industrial arts program in Alberta is completed. It can now be related to the six criteria of program evaluation which form the rationale applicable to the particular characteristics of industrial arts education.

Related to the Criteria Particular to Industrial Arts Programs

(1) The industrial arts program is so designed that all Alberta youth have access to it:

The preceding explanation illustrates that all youth in Alberta have access to Level I of the industrial arts program. At this level all junior high school youth are able to gain access, hypothetically, to the junior high school program of industrial arts. The General Mechanics program of industrial arts in Level III enables all senior high school youth to gain access, hypothetically, to the industrial arts program at the senior high school level. Level I and the General Mechanics section of Level III of the industrial arts program in Alberta are, therefore, compatible with this criterion.

Level II, the unit shop section of Level III, and Level IV involve

student selection of one or two courses from about seven specialized courses in each grade of the senior high school. The fact that selection is required within the industrial arts program at each of these levels, means that only fragments of the program, as defined, are accessible to all Alberta youth. Level II, the unit shop section of Level III, and Level IV of the industrial arts program in Alberta are, therefore, interpreted as not compatible with this criterion.

(2) The industrial arts program interprets the world of work, with the major industries in Alberta and Canada as its salient component:

The preceding explanation illustrated that the program of industrial arts in Alberta was centered mainly around industrial materials. Certain courses within the program were interpreted as indicating a positive relationship with the following major industries in Canada.

TABLE X

RELATIONSHIP OF THE INDUSTRIAL ARTS COURSES IN ALBERTA TO THE MAJOR INDUSTRIAL CLASSIFICATIONS IN CANADA

Industrial Classifications in Canada	Industrial Arts Course
Agriculture	Agriculture
Communication	Electricity
Transportation equipment	Automotives
Metal fabricating	Metalwork
Paper and allied industries	Graphic Arts
Wood industries	Woodwork
Primary metal industries	Metalwork
Electrical products industries	Electricity
Printing, publishing and allied industries	Graphic Arts

Certain courses within the program were interpreted as indicating a positive relationship with the following major industries in Alberta:

TABLE XI

RELATIONSHIP OF THE INDUSTRIAL ARTS COURSES IN ALBERTA TO THE MAJOR INDUSTRIAL CLASSIFICATIONS IN ALBERTA

Industrial Classifications in Alberta	Industrial Arts Course
Agriculture	Agriculture
Communication	Electricity

There are severe limitations to a direct comparison between major industrial classifications and course terms, and these are recognized. The degree of connection between the two, however, is clear.

It appeared that only nine of the thirty-two major Canadian industries show a positive relationship with the courses in the industrial arts program in Alberta. Six of the nine industries that were directly related to the program were those that employed fewer than 105,000 persons. The total labour force in Canada in 1961 was 6,471,850.[22]

Two of the seventeen major industries in Alberta indicated a positive relationship with the courses included in the industrial arts program in Alberta.

The lack of relationship that appears to exist between the major industries of Canada and Alberta, and the courses which constitute the industrial arts program in Alberta is interpreted as an indication that the program has a very low degree of compatibility with this criterion. Although the two do not conflict, there appears to be little relationship between them.

The four sub-criteria which were included under the second criterion required that a program of industrial arts be concerned with developing understandings and skills, and having experiences in particular components of the major industries in Alberta and Canada. These features included: methods of production, processes, products, occupations, skills, and the pattern of human-relationships which were evident

---

[22] Dominion Bureau of Statistics, _op_. _cit_., p. 1A-1.

in the major industries in Alberta and Canada. Because the program of industrial arts in Alberta was interpreted as illustrating little relationship with the major industries of which these features are but a part, the degree of compatibility between the program and the sub-criteria could not be high.

As an example, the second sub-criterion requires that a program of industrial arts include the exploration of occupations which are found in the major industries of Alberta and Canada. It seems reasonable to assume that the occupations which would be explored would be those that are connected with the industries which are represented in a designated program. It does not seem likely, for example, that a program of industrial arts which does not reflect industrial classifications such as retail and wholesale trade, administration, and personal services, would include the exploration of occupations characteristic to these industrial classifications.

The program of industrial arts in Alberta, therefore, was interpreted as indicating the same degree of compatibility with the four sub-criteria as it did with the second criterion. That degree of compatibility was very low: there appeared to be little relationship between them.

In summary, one level and a section of another level of the industrial arts program in Alberta were found to be compatible with the first criterion. The program of industrial arts in Alberta was found to indicate a very low degree of compatibility with the second criterion and the four sub-criteria.

Programs representative of the three major approaches to industrial arts education will now be described and analyzed using a process identical with that used for the Alberta program. Such an analysis should provide a basis for comparison between the Alberta program of industrial arts and industrial arts programs in general.

III. PROGRAMS OF INDUSTRIAL ARTS SUGGESTED BY THE THREE MAJOR APPROACHES

Programs suggested by authors representative of the trade and job analysis, behavioral change, and industrial categories approaches to industrial arts education will now be explained, interpreted and related to the criteria particular to industrial arts programs. The same authors who were selected as representative of the analysis of industrial arts objectives were also selected for the analysis of industrial arts programs.

Programs of industrial arts are not as plentiful in the literature as are suggested lists of objectives. Authors, generally, appear hesitant and reluctant to describe a definite program of industrial arts -- the concern appears to be primarily with objectives, purposes, criteria for the selection of content, and procedures for course construction. Of the six lists of objectives presented earlier as representative of the three major approaches to industrial arts, only the Industrial Arts Policy and Planning Committee and Olson supplement the objectives with a suggested program.

Friese, Ericson, and Wilber did not describe programs of industrial

arts. They did, however, refer to programs and indicate courses for the junior and senior high schools. These were considered indicative of suggested programs for the purpose of analysis which follows. Giachino and Gallington did not refer to courses other than for illustrative purposes of analyzing operations and related information. They did not suggest courses for either the junior or senior high school.

Programs of the Trade and Job Analysis Approach

Friese. The program Friese visualized for industrial arts centered around industrial materials areas. With respect to industrial arts programs, regardless of grade level, he stated:

> Industrial arts naturally recognizes machine production but by common consent and usage retains the older concept of manual arts in so far as it relates only indirectly to the assembling trades, such as the building trades, printing, and automotive repair. Handicrafts also have an important place.[23]
>
> . . . .
>
> A number of studies show the very decided trend toward differentiated industrial arts offerings. Emphasis has rapidly shifted away from just woodwork and mechanical drawing. The exploration possible through woodwork and mechanical drawing is naturally limited. . .[24]
>
> . . . .
>
> . . . exploratory and finding courses for guidance should sample a number of the common and typical industrial occupations. Electricity, home mechanics, art crafts, sheet metalwork, automechanics, and printing classes are growing in numbers as industrial arts try-out courses.[25]

---

[23] Friese, op. cit., p. 49.

[24] Ibid., p. 194.

[25] Ibid., p. 202.

Some of the courses which Friese would include in a program of industrial arts are indicated in the above statements. They are woodwork and drafting (decreasing in emphasis), electricity, home-mechanics, art crafts, sheet metalwork, auto-mechanics and printing.

Friese considered the function of industrial arts in the junior high school to be different from that in the senior high school. With regard to the junior high school, he said "Industrial arts in the seventh through ninth grades consists of common learnings applicable to boys or boys and girls jointly".[26] As he saw it, the function of the program in the senior high school was quite different:

> ... Industrial subjects in the senior high school are not usually a part of "general" education in the same full sense that the industrial arts are in the junior high school.. .[27]

Friese, therefore, recommended that all youth in the junior high school should have access to the program, but the senior high school program was concerned with specialized activities unique to specific vocations.

Ericson. The program of industrial arts visualized by Ericson was not unlike that of Friese. He believed that modern industry was the source of programs in industrial arts, but realized that such a broad field of potential subject matter would involve selection. Before modern industry could be considered useful for school purposes, an

---

[26] Friese, op. cit., p. 62.

[27] Ibid., p. 49.

analysis must be made of its content and processes.[28]

Referring to the junior high school program, Ericson stated:

> There is now a fairly uniform group of subjects accepted for short, unit courses in the large junior high school. In this group would probably come: (1) woodwork, (2) electrical work, (3) drawing, (4) metalwork, (5) printing.[29]

He also considered courses in home-mechanics, cement work, handicrafts, aviation, photography, and plastics, legitimate areas of study for industrial arts education.[30]

Ericson recommended that girls as well as boys have opportunities to work with tools and materials. However, all students could not have experiences in the high school program, for he stated: "Shopwork in the senior high school based upon the vocational objective should be and usually is organized upon the basis of trade analysis."[31]

Programs of industrial arts referred to by Friese and Ericson constitute those considered representative of the trade and job analysis approach to industrial arts education. The programs are almost identical. Both authors perceive the function of industrial arts at the junior high school level to be that of exploration of industrial materials areas and at the senior high school to be that of vocational preparation. The courses which would be included in an industrial arts program representative of the trade and job analysis approach are woodwork, drafting,

---

[28] Ericson, _op_. _cit_., p. 270.

[29] _Ibid_., p. 279.

[30] _Ibid_.

[31] _Ibid_., p. 280.

electricity, metalwork, art crafts, home-mechanics, printing, cement work, mechanics (automotive and aviation), photography, and plastics.

Programs of the Behavioral Change Approach

Wilber. A definite program of industrial arts was not proposed by Wilber. He did, however, refer to eight courses and recommended that programs contain as many of these as possible. He indicated that a multiple-activity general shop would contain:

> . . . In a general shop these might include: (1) instructional area, (2) planning, drafting, (3) woods, (4) metals, (5) electricity and communications, (6) power and transportation, (7) graphic arts, (8) ceramics, (9) textiles, and (10) assembly.[32]

Wilber recommended that all youth have access to industrial arts programs - ". . . It appears, therefore, that a subject such as industrial arts should be included in the school curriculum to orient youths to living in this highly industrialized society."[33] However, he supported the general shop organization at the junior high school level, and the unit shop organization, with its prevocational emphasis at the senior high school level.[34]

Industrial Arts Policy and Planning Committee. This committee suggested eleven activities [courses] which could be included in an industrial arts program. The suggested activities which the Committee

---

[32] Wilber, *op. cit.*, p. 280.

[33] *Ibid.*, p. 29.

[34] *Ibid.*, p. 110.

presented were intended to serve as examples, and were not intended to be all-inclusive. The suggested activities are: drawing and planning, woodworking, metalworking, electricity and radio, graphic arts, transportation and power, plastics, leatherwork, ceramics, textiles, and home mechanics.[35] No differentiation of courses in industrial arts for the junior and senior high school was proposed, but a difference in function was stated. In relation to the type of shop organization, the committee stated:

> The comprehensive general shop is best characterized by the broad scope and variety of experience it offers to junior high school boys and girls or high school students taking industrial arts for the first time.[36]

The committee envisioned a different function for industrial arts at the senior high school level:

> It is important that a clear distinction be made between the industrial arts and vocational objectives of [courses]. At the junior high and early senior high levels, the general educational outcomes should be stressed, while during the latter years of the senior high school, [a course] will certainly have some vocational implications.[37]

And further, in regard to the unit shop type of organization, "...Such organization is now found largely at the senior high school level where there appears to be need for extensive specialization. . ."[38]

---

[35] American Vocational Association, _op_. _cit_., pp. 45-98.

[36] _Ibid_., p. 42.

[37] _Ibid_., p. 45.

[38] _Ibid_., p. 32.

Programs of industrial arts described by the Industrial Arts Policy and Planning Committee and indicated by Wilber constitute those considered representative of the behavioral change approach to industrial arts education. The two programs are not fundamentally unlike. The courses include drafting, woodwork, metalwork, electricity, graphic arts, transportation and power, plastics, leatherwork, ceramics, textiles, and home-mechanics. Both programs support the general shop organization at the junior high school level, and the unit shop organization, with its accompanying emphasis on specialization, at the senior high school level.

Program of the Industrial Categories Approach

Olson's program of industrial arts was organized differently from any of those that have been described to this point. An interpretation of the major dimensions of current American industry constituted the elements in Olson's program. The dimensions were considered to be: manufacturing, construction, power, transportation, electronics, research, services, and management.[39]

Olson regarded industrial arts education to be of value to all youth.[40] There was a differentiation of function of industrial arts between the junior and senior high school levels. The junior high school program should be devoted to "a breadth of awareness", and the senior high school program should be "exploration in depth."[41]

---

[39] Olson, *op. cit.*, p. 41.

[40] *Ibid.*, p. 228.

[41] *Ibid.*, p. 245.

Olson recommended that two types of shop organization be used for the industrial categories program -- the composite [general] laboratory, and the unit laboratory. The program was organized into the following grade levels:

Grade 7	The laboratory of industries, with major emphasis on the recreation function
Grade 8	The manufacturing industries
Grade 9	The construction industries
Grade 10	Electronics
Grade 11	Power and transportation
Grade 12	Management and services

Research and development would appear integrally in every program.[42]

Because the industrial categories program of industrial arts was not centered around industrial materials, a more complete description of the program will increase understanding of it. The description is related to the types of laboratories required for the implementation of the program.

> Grade 7. The composite [general] type is called the laboratory of industries; it would include centers for manufacturing, construction, power, transportation, electronics, research, and management. Services would likely be integral with the centers. Such a laboratory would be adaptable for one or more teachers and is recommended for general orientation purposes preliminary to study in the unit laboratories. . .

---

[42] Ibid., p. 228.

> Grade 8. The manufacturing laboratory should include centers for production involving the categories analyzed under manufacturing . . . These are: ceramics, chemicals, foods, graphic arts, leather, metals, paper, plastics, rubber, textiles, tools and machines, and woods. . .
>
> Grade 9. The construction laboratory would be the setting for the study of the construction industries. As such it would have the necessary facilities for work, study, and experiment with the materials, structures, and equipment representative of those industries.
>
> Grade 10. The electronics laboratory should provide the facilities for experiment and construction with electronic components. Typical basic electronic equipment should be included for the purposes of study of design, assembly, and operation. . .
>
> Grade 11. Because of the working relationship between power and transportation, it seems best to propose one laboratory serving both. The power center would include live and dead power units representative of the many common types of engines and motors, as well as power transmission systems. The transportation center would provide examples of air, water, rail, vehicle, conveyor types of transportation. . .
>
> Grade 12. The service industries could be accommodated integrally with the manufacturing, construction, power, transportation, and electronics laboratories, or they could be housed in a unit laboratory. . . In both cases the services industries would be represented by facilities for maintaining, repairing, rebuilding, and refinishing of manufactured products. . .
>
> Grades 7 to 12. The research and development center may properly be an integral part of each unit laboratory. It is the idea center and in larger school systems could be given unit status. In this position it would house charts, samples, models, mock-ups of mechanisms, simple machines as in physics and mechanics, typical structures in various materials, power transmission devices, electrical circuits, hydraulic systems, and such elements basic to the development of products and projects. . .
>
> Grades 7 to 12. The industrial arts recreational center is recommended for larger schools to accompany the other laboratories. Designed solely for purposes of recreation, it should include diversified facilities for work with the basic materials.[43]

---

[43] *Ibid.*, pp. 234-235.

The programs of industrial arts indicated by Friese, Ericson, Wilber, The Industrial Arts Policy and Planning Committee, and Olson, are considered representative of industrial arts programs in general. They can now be summarized and related to the particular characteristics of industrial arts education. To achieve this purpose, Table XII, on page 113, has been developed.

TABLE XII

SUMMARY OF REPRESENTATIVE PROGRAMS
OF INDUSTRIAL ARTS

GRADES	TRADE AND JOB ANALYSIS PROGRAM	BEHAVIORAL CHANGE PROGRAM	INDUSTRIAL CATEGORIES PROGRAM	
7	General Shop - Activities in: Drawing	General Shop - Activities in: Drawing Woodwork Metalwork	General Shop - Manufacturing Construction Power Transportation Research Management Services	Research, Development, Recreation
8	Woodwork Electricity Metalwork	Electricity and communication Graphic Arts Plastics Leatherwork Ceramics	Unit Shop - Manufacturing industries, such as: ceramics, leather, chemicals, paper, foods, rubber, metals, woods, plastics	
9	Printing	Textiles Power and transportation Home mechanics	Unit Shop - Construction industries, such as: carpentry, air conditioning, decoration, communications, flooring, etc.	
10	Unit Shop - Vocational courses in: Drawing Woodwork Electricity	Unit Shop - Vocational courses in: activities in a single industrial occupation, such as:	Unit Shop - Electronics	Research, Development, Recreation
11	Metalwork Printing Home-mechanics Cement work	Machine Shop Welding	Unit Shop - Power and transportation	
12	Plastics Automotives Handcrafts Aviation Photography	Letterpress printing Cabinet making Sheet metal work	Unit Shop - Management and services	

Summary of Courses in Representative Programs

Table XII, page 113, illustrated that the program suggested by the trade and job analysis approach and that suggested by the behavioral change approach are not unlike. In both programs the junior high school courses are taught in general shops and are centered around the apprenticeable trades and industrial materials areas. The senior high school courses are taught in unit shops and are intended to reflect vocational or pre-vocational purposes. The senior high school courses in the behavioral change program appear to be more specialized than those of the trade and job analysis program, but with this exception, the design of the two programs and the courses within the programs are almost identical.

The industrial categories program is different from the programs of the behavioral change approach and the trade and job analysis approach. The industrial categories program requires that all students must receive instruction in industrial arts for six years if they are to benefit from each of the courses.[44] Specialization in the industrial categories program begins in grade eight, following an exploratory course in grade seven. The exploratory course introduces each of the industrial categories which follow at later grade levels. Research and development, and management and services are present in the industrial categories program. Additional materials areas, such as chemicals, foods, and rubber, are also included in this program.

The description of representative programs of industrial arts is

---

[44] *Ibid.*, pp. 228-229.

completed. The programs can now be related to the criteria particular to industrial arts programs.

Related to the Criteria Particular to Industrial Arts Programs

The programs representing the three major approaches of industrial arts do not lend themselves to an interpretation and analysis in which the different programs are considered as one group; that is, the programs suggested by the trade and job analysis and the behavioral change approaches are similar to each other but are different from the program suggested by the industrial categories approach. To facilitate analysis, therefore, the trade and job analysis program and the behavioral change program are interpreted conjointly, and the industrial categories program is interpreted separately.

Trade and job analysis and behavioral change programs.

(1) The industrial arts program is so designed that all Alberta youth have access to it:

Junior high school youth have access, hypothetically, to these programs in grades seven, eight, and nine. The two programs at the junior high school level are, therefore, interpreted as compatible with this criterion.

Senior high school youth must select one or two specialized courses from the many which constitute both programs at this level. This means, therefore, that all youth have access, hypothetically, only to segments of the trade and job analysis and behavioral change programs at the senior high school level. Consequently the senior high school

level of the two programs is interpreted as incompatible with this criterion.

(2) The industrial arts program interprets the world of work, with the major industries in Alberta and Canada as its salient component:

The trade and job analysis and the behavioral change programs of industrial arts are centered mainly around industrial materials areas. Certain courses within each of the two programs indicate a positive relationship to the major industries in Canada and Alberta. The courses which are interpreted as indicating a positive relationship with the major industries in Canada are illustrated in Table XIII, page 117.

TABLE XIII

RELATIONSHIP OF TRADE AND JOB ANALYSIS AND BEHAVIORAL CHANGE PROGRAMS TO THE MAJOR INDUSTRIAL CLASSIFICATIONS IN CANADA

Industrial Classification in Canada	Trade and Job Analysis Program	Behavioral Change Program
Communication	Electricity	Electricity and communication
Transportation		Power and transportation
Transportation equipment	Automotives Aviation	Power and transportation
Metal fabricating	Metalwork	Metalwork Machine shop Sheet metalwork
Paper and allied industries	Printing	Graphic arts Letterpress printing
Wood industries	Woodwork	Woodwork Cabinetmaking
Primary metal industries	Metalwork	Metalwork Machine shop Welding
Electrical products	Electricity	Electricity
Printing, publishing and allied industries	Printing Photography	Graphic arts Letterpress printing
Textile industries		Textiles

The courses within the two programs which are interpreted as indicating a positive relationship with the major industries in Alberta are showed in Table XIV, page 118.

TABLE XIV

RELATIONSHIP OF TRADE AND JOB ANALYSIS AND BEHAVIORAL CHANGE PROGRAMS TO THE MAJOR INDUSTRIAL CLASSIFICATIONS IN ALBERTA

Industrial Classifications in Alberta	Trade and Job Analysis Program	Behavioral Change Program
Transportation		Power and transportation
Communication	Electricity	Electricity and communication

As in the case of the program of industrial arts in Alberta, the limitations of relating course terms to industrial classifications was also recognized here. However, the degree of connection between the two programs and the major industries in Canada and Alberta was apparent.

It appeared that the trade and job analysis program related to eight of the thirty-two major industries in Canada. Not any of the eight related to the ten major industries in Canada. The program related to one of the seventeen major industries in Alberta--an industry employing less than 10,000 persons.

It appeared that the behavioral change program related to ten of the thirty-two major industries in Canada. The program related to the same industrial classifications as did the trade and job analysis program and, in addition, related to the transportation and textile industries. The behavioral change program related to two of the seventeen major industries in Alberta.

Regarding the relationship to the major industries in Canada and

Alberta, the two programs were not unlike. The trade and job analysis and the behavioral change programs of industrial arts were, consequently, interpreted as indicating a very low degree of compatibility with the major industries in Canada and Alberta. It appeared that there was little relationship between them.

The four sub-criteria to which industrial arts programs are related, are constituents of the second criterion. Each of the sub-criteria is concerned with specific components of the world of work.

Because the trade and job analysis and the behavioral change programs of industrial arts appeared to indicate little relationship with the major industries in Canada and Alberta, the degree of compatibility between the two programs and each of the sub-criteria could not be high.

The trade and job analysis and the behavioral change programs, therefore, are interpreted as indicating the same degree of compatibility with the four sub-criteria as they did with the second criterion. That degree of compatibility was very low. There appeared to be little relationship between them.

The industrial categories program.

(1) The industrial arts program is so designed that all Alberta youth have access to it:

Olson recommends that youth receive instruction in the industrial categories program for six years. Students are not required to select courses within the program, and consequently have access, hypothetically,

to the complete program. The industrial categories program of industrial arts, therefore, is interpreted as compatible with this criterion.

(2) The industrial arts program interprets the world of work, with the major industries in Alberta and Canada as its salient component:

The industrial categories program is designed not only around industrial materials areas, as are the two previous programs, but also around industrial classifications. With the same recognized limitations as previously noted, the program is considered to indicate a positive relationship to the following major industries in Canada.

TABLE XV

RELATIONSHIP OF THE INDUSTRIAL CATEGORIES PROGRAM TO THE MAJOR INDUSTRIAL CLASSIFICATIONS IN CANADA

Industrial Classifications in Canada	Industrial Categories Laboratories
Construction	Construction
Transportation	Transportation
Federal administration	Management
Food and beverage	Manufacturing
Communication	Electronics
Local administration	Management
Transportation equipment	Transportation
Metal fabricating	Manufacturing
Paper and allied industries	Manufacturing
Wood industries	Manufacturing
Primary metal industries	Manufacturing
Electronical products	Electronics
Printing, publishing	Manufacturing
Electric power, gas, and water	Power
Chemical and chemical products	Manufacturing
Provincial administration	Management
Textile industries	Manufacturing
Miscellaneous service industries	Services
Miscellaneous manufacturing	Manufacturing

The industrial categories laboratories which are interpreted as indicating a positive relationship with the major industries in Alberta are shown in Table XVI, page 122.

TABLE XVI

RELATIONSHIP OF THE INDUSTRIAL CATEGORIES PROGRAM TO THE MAJOR INDUSTRIAL CLASSIFICATIONS IN ALBERTA

Industrial Classifications in Alberta	Industrial Categories Laboratories
Construction	Construction
Transportation	Transportation
Federal Administration	Management
Food and beverage industry	Manufacturing
Local administration	Management
Communication	Electronics
Mineral fuels	Power
Provincial administration	Management

There appeared to be more relationship or connection between the industrial categories program and the major industries in Canada and Alberta than was apparent in the two previous programs described. The industrial categories program appeared to relate to nineteen of the thirty-two major Canadian industries and to eight of the major industries in Alberta. This program of industrial arts, therefore, was interpreted as indicating a considerable degree of compatibility with the major industries in Canada and Alberta.

The design of the industrial categories program did not indicate a special concern for any of the four sub-criteria which were constituents of the second criterion. It seems likely, however, that the processes, products, skills, occupations, and patterns of human-relationships inherent in those major industrial classifications to which the program relates, would be a part of the industrial categories program.

Consequently, the industrial categories program was interpreted as indicating the same degree of compatibility with the four sub-criteria as it did with the second criterion. There appeared to be a fair degree of relationship between them.

IV. A COMPARISON OF THE INDUSTRIAL ARTS PROGRAM IN ALBERTA WITH REPRESENTATIVE PROGRAMS OF INDUSTRIAL ARTS

The fourth purpose of this chapter, stated previously, is to compare the program of industrial arts in Alberta with programs of industrial arts representative of the three major approaches to industrial arts education. The purpose of the comparison is not to determine which program appears to be the right program or the better program. Implications concerning this may be drawn from the preceding analyses. The purpose is, rather, to collate the industrial arts program in Alberta with industrial arts programs in general. Table XVII, page 124, was developed so that the similarities and differences between the program of industrial arts in Alberta and industrial arts programs in general could be readily distinguished. The collation shown in this table, while not exhaustive, was considered sufficiently illustrative of the points of agreement and divergence for the purposes of this study.

TABLE XVII

COMPARISON OF REPRESENTATIVE PROGRAMS OF INDUSTRIAL ARTS

GRADES	ALBERTA	TRADE AND JOB ANALYSIS PROGRAM	BEHAVIORAL CHANGE PROGRAM	INDUSTRIAL CATEGORIES PROGRAM	
7	General Shop - Activities in: Drafting Woodwork	General Shop - Activities in: Drawing	General Shop - Activities in: Drawing Woodwork Metalwork Electricity and communication	General Shop - Manufacturing Construction Power Transportation Research Management Services	Research, Development, and Recreation
8	Metalwork Plastics Leather	Woodwork Electricity Metalwork	Graphic Arts Plastics Leatherwork Ceramics Textiles	Unit Shop - Manufacturing industries such as: ceramics, leather, chemicals, paper, foods, rubber, metals, woods, plastics, etc.	
9	Electricity Art Metal	Printing	Power and transportation Home mechanics	Unit Shop - Construction industries such as: carpentry, air conditioning, decoration, communications, flooring, etc.	

TABLE XVII (continued)

GRADES	ALBERTA	TRADE AND JOB ANALYSIS PROGRAM	BEHAVIORAL CHANGE PROGRAM	INDUSTRIAL CATEGORIES PROGRAM	
10	Unit Shop -and General Shop Vocational courses in: Drafting Woodwork Metalwork Electricity Automotives Printing Arts and crafts Agriculture Exploratory courses same as vocational, and in addition, units on concrete and plumbing, farm machinery	Unit Shop - Vocational courses in: Drawing Woodwork Electricity Metalwork Printing Home-mechanics Cement work Plastics Automotives Handcrafts Aviation Photography	Unit Shop - Vocational courses in: activities in a single industrial occupation, such as: Machine Shop Welding Letterpress printing Cabinet making Sheet metal work	Unit Shop - Electronics	Recreation
11				Unit Shop - Power and transportation	Development, and
12				Unit Shop - Management and services	Research,

Table XVII, pages 124-125, illustrates the program of industrial arts in Alberta to be not unlike the programs of the trade and job analysis and behavioral change approaches to industrial arts education. In each of these the junior high school courses are taught in general shops and are mainly centered around industrial materials areas. The senior high school courses are taught in unit shops and have vocational purposes. The senior high school courses in the behavioral change program appear to be more specialized than the trade and job analysis and Alberta courses. Other than this, the design of the three programs and the courses within the programs are nearly identical.

The design of the industrial categories program is somewhat different from the behavioral change, trade and job analysis, and Alberta programs. Specialization begins in grade eight, following one year of exploratory experiences. Research and development and management and services are included in the industrial categories program.

This study has intentionally refrained from referring, as sources of reference, to industrial arts curriculum guides used in areas other than Alberta. However, the results of a study conducted by the Office of Education in the United States are relevant here. That study indicated that programs of industrial arts are similar to those suggested by the trade and job analysis and, to a lesser degree, the behavioral change approaches:

> The prime factor for selecting the courses to be analyzed was the frequency of their occurrence in the curriculum guides. An analysis revealed the frequency of each course and they were selected on that basis. The areas of drawing and planning, woodworking, metalworking,

> and electricity and radio (electronics) were consistently reported. The areas of graphic arts, transportation and power mechanics, and plastics were reported to a less degree. . .[45]

With regard to the design of industrial arts programs, the study found:

> . . . At the junior high school level (grades 7, 8, and 9), a broad exploratory base for students is provided for in the industrial arts curriculum. In the senior high school (grades 10, 11, and 12), the program gives greater depth of experience in one or more courses such as electricity and radio (electronics), graphic arts, and woodworking.[46]

If the results of the study by Schmitt, Harrison, and Pelly are accepted, then it can be stated that in general the program of industrial arts in Alberta is not unlike programs of industrial arts.

V. AN ALTERNATIVE PROGRAM OF INDUSTRIAL ARTS

The alternative program to be described here is that developed by Henry R. Ziel. The Ziel program is divided into four levels or phases. Each phase, recommended for boys and girls, is conducted in a multiple-activity laboratory. A well-planned and equipped multiple-activity laboratory can accommodate all four phases of this program. There are two distinct areas in the design of the laboratory and two instructors are required to teach the total program: it therefore is considered as two laboratories. The purpose of the program is to interpret the world

---

[45] L. M. Schmitt, P. E. Harrison, and A. L. Pelly, Industrial Arts - An Analysis of 39 State Curriculum Guides: 1953-1958. Bulletin 1961, No. 17, (Washington: United States Government Printing Office, 1961), p. 4.

[46] *Ibid.*, p. 64.

of work, as evidenced by the following statement:

> . . . The industrial arts teacher has the obligation to interpret the industrial environment to students by a meaningful translation of the multiple forces inherent in the dynamic world of work.[47]

The four phases of the Ziel program are:

Phase 1. The initial phase is an introductory and exploratory level recommended for grade seven students. "Phase I would be devoted to an introduction to and an appreciation of tools, machines, and materials."[48] Electricity, graphic arts, ceramics, plastics, woods, and metals are the industrial materials areas included in this phase.

Phase 2. "The students are introduced to the various technologies prevalent in the world of work and the interdependence of these technologies."[49] This grade eight and nine exploratory experience includes the "most representative technologies."[50] The multiple-track phase encompasses electricity-electronics technology, computer technology, mechanical technology, power technology, power transmission, graphic communications, and materials and processes technology.

Phase 3. This is an activity level in which grade ten students produce a product or service. The program at this level is primarily concerned with developing understandings by participating in a simulated organization.

---

[47] H. R. Ziel, "A New Concept of the Industrial Arts Program," The ATA Magazine, 43:6 (February, 1963), p. 21.

[48] Ibid., p. 18.

[49] Ibid., p. 19.

[50] Ibid.

> . . . This phase provides an educational experience that exposes students to the many technological demands imposed upon organizations and their members as they function to fulfill the purpose of the organization. . .[51]

Phase 4. Ziel recommends that grade eleven and twelve students study a combination of technologies at this level. Two or three of the technologies explored in phase two should be studied in depth during the final two years of senior high school.

> . . . Since most occupational titles in the world of work, at the technician level or less, employ knowledge in a combination of technologies, it is recommended that these students pursue two or three of the previously enumerated technologies in depth. Referring to the previously mentioned profile a student could conceivably select a combination such as electronic-mechanical or any other suitable combination.[52]

The industrial arts program suggested by Ziel can now be related to the six criteria particular to industrial arts programs.

(1) The industrial arts program is so designed that all Alberta youth have access to it.

Phases one, two and three of the Ziel program are so designed as to permit all Alberta youth access, hypothetically, to the program. Grade seven, eight, nine, and ten students, therefore, could experience the complete scope of the program by the end of grade ten. Consequently, the first three phases of the Ziel program are interpreted as compatible with this criterion.

Selection of two or three of the seven technologies is required

---

[51] Ibid., p. 20.

[52] Ibid.

in phase four. This means that students would receive only segments of the program and not the entire program during grades eleven and twelve. The omitted segments of the program which would result from selection, however, are included in phase two. Selection of courses which results in omission of part of the program is not in harmony with the criterion established. Phase four of the Ziel program, therefore, is interpreted as incompatible with this criterion.

(2) The industrial arts program interprets the world of work, with the major industries in Alberta and Canada as a salient component:

The design of the Ziel program does not lend itself to a direct comparison between its inherent courses and the major industries in Canada and Alberta. However, the industrial materials areas in phase one alone would indicate the same degree of relationship with the major industries as that found in the complete trade and job analysis program and the complete program of industrial arts in Alberta. The management industries to which the industrial categories program relates are also evident in phase three of the Ziel program. The mineral fuels and electric power, gas and water utilities, both of which are major industries related to the industrial categories program are included in Ziel's power technology. The Ziel program does not relate to the miscellaneous service industry as completely as does the industrial categories program. The Ziel program, however, relates to the two largest industrial classifications within the miscellaneous industry: labour organizations and photography. The industrial categories program included the remaining

classifications within this industry, such as blacksmithing and miscellaneous repair shops, none of which are included in the Ziel program. To this point, therefore, the Ziel program appears to relate essentially to the same major industries as those of the industrial categories program. The major industries of banking and distribution are also included in the Ziel program of industrial arts: "It develops understanding of the ways in which these technologies are used in areas such as banking, manufacturing, construction and distrubution."[53] Inclusion of these additional major industries permits an interpretation which indicates a fairly high degree of compatibility between the Ziel program and the major industries in Canada and Alberta. There appears to be a fairly high degree of relationship between them.

The four sub-criteria which are included under the second criterion require that a program of industrial arts be concerned with components of the world of work. Because the Ziel program of industrial arts appears to indicate a fairly high degree of relationship to the major industries, it seems likely that the Ziel program would also indicate a fairly high degree of relationship with the components of the major industries.

A critical examination of the program of industrial arts suggested by Ziel illustrates that there are three distinctive features peculiar to it which require comment. The first of these is the setting or

---

[53] H. R. Ziel, "A Teaching Career in Industrial Arts," Pamphlet, University of Alberta, (Edmonton: University Printing Services, 1962).

environment in which the program is accommodated. Two multiple-activity laboratories are sufficient for each of the areas within a phase and also for each of the phases within the program. Programs such as those in Alberta require both general shops and specialized unit shops. A minimum of nine separate laboratories is required to accommodate Olson's elaborate program of industrial arts. The difference in the cost of building and equipping two multiple-activity laboratories and of building and equipping as many as nine separate laboratories is obvious. Notwithstanding this factor, the particular accommodation suggested in the Ziel program was interpreted as possibly having a significant effect on the outcomes of the program.

The fact that the seven technological areas (or six industrial materials areas) are contained within one multiple-activity laboratory could tend to illustrate the interrelationships that exist between components of the world of work. It would appear that the practice of divorcing one technological area from another or of divorcing one unit shop from another would decrease the effectiveness of illustrating relationships that exist in the production of a product or service.

The second feature peculiar to the Ziel program is the particular seven technologies considered representative of the world of work. Olson's system of classifying contemporary industry into its curricular components resulted in a program which appeared to indicate considerable relationship with the major industries in Canada and Alberta. However, by including transportation and construction, neither of which are

technologies in themselves according to his definition,[54] Olson retains some of the content of which he is critical. The seven technologies suggested by Ziel are considered basic to all institutions in the world of work. In this regard, he made the following comment:

> Understanding the world of work is a very large undertaking. As industrial arts teachers we must look for factors which are inherent in all productive organizations when we take up the task of selecting content which will facilitate this understanding. We find that regardless of the institution's role, whether it be raw material, product or service, there are some common denominators in all.
>
> Tools, machines and materials play a profound role in all productive organizations.
>
> Certain technological processes are inherent in all kinds of organizations, e.g. communication, power and power transmission, electricity-electronics.
>
> All business enterprises have an authority configuration that is imposed by the formal organization as well as the informal organization.
>
> All organizations create pressures which have profound influences upon the effectiveness of employees and upon the entire population.
>
> All organizations involve some degree of specialization and are faced with the problem of integrating specialized skills and knowledges into a productive system.[55]

The conceptual basis for selecting the particular seven technologies was not expressed in Ziel's explanation of the program. The process of attempting to determine the basic structure of a field of subject matter is, however, certainly in harmony with a major following of current educational thought and practice.[56] The advantages and effects of

---

[54] D. Olson, *op. cit.*, p. 6.

[55] H. R. Ziel, "A New Concept of the Industrial Arts Program," *The ATA Magazine*. 43:6 (February, 1963), p. 21.

[56] J. S. Bruner, *The Process of Education*. (Cambridge: Harvard University Press, 1961).

electronic computers, for example, are evident in educational, political, industrial, and financial institutions of contemporary Canadian society.

The third feature peculiar to the Ziel program is the suggestion that the initial year of the senior high school program be devoted to a study of the sociological components of industry. This feature is directly related to the fourth sub-criterion particular to industrial arts programs. In a description of phase three, Ziel stated:

> It creates awareness of the roles of people in an organization and develops understanding of the forces which are encountered by individuals and groups in the various positions found in the world of work.[57]

The completion of the description of the Ziel program accomplishes the final purpose of this chapter. A summary of the process used and the findings inherent in this chapter can now be stated.

VI. SUMMARY

The chapter began with the assumption that the particular characteristics of industrial arts education, which were disclosed in Chapter III, would provide a frame of reference to which industrial arts programs could be related. A more thorough description of two of the particular characteristics was given. An interpretation of the term general education as it is used in Alberta, and of the world of work implied by major industrial categories in Canada and Alberta was presented. Six criteria particular to industrial arts programs were

---

[57] H. R. Ziel, "A Teaching Career in Industrial Arts," Pamphlet, University of Alberta, (Edmonton: University Printing Services, 1962).

established from the more thorough description of the characteristics of industrial arts education. In review, the criteria were as follows:

(1) The industrial arts program is so designed that all Alberta youth have access to it.

(2) The industrial arts program interprets the world of work, with the major industries in Alberta and Canada as its salient components.

(a) the industrial arts program develops understandings and provides experiences in the methods of production, the processes, and the products, relevant to and resulting from the major industries in Alberta and Canada.

(b) the industrial arts program explores occupations relevant to the major industries in Alberta and Canada.

(c) the industrial arts program develops skills in the industrial processes relevant to the major industries in Alberta and Canada.

(d) the industrial arts program develops understandings of the organization and patterns of human-relationships relevant to the major industries in Alberta and Canada.

The program of industrial arts in Alberta was described and related to the six criteria particular to industrial arts programs. Level I (junior high school) and the general mechanics section of Level III (senior high school) were compatible with the first criterion. All levels indicated a very low degree of compatibility with the second

criterion and its four sub-criteria. This is, the four levels in the industrial arts program in Alberta appeared to relate to only a small portion of the major industries in Alberta and Canada.

Programs representative of the trade and job analysis, behavioral change, and industrial categories approaches to industrial arts education were described and related to the six criteria particular to industrial arts programs. The junior high school programs of the trade and job analysis and the behavioral change approaches were compatible with the first criterion. The entire program of the industrial categories approach was compatible with the first criterion.

The programs representative of industrial arts in general indicated varying degrees of compatibility with the second criterion: the trade and job analysis program appeared to indicate a very low degree of relationship with the major industries in Canada and Alberta; the behavioral change program appeared to indicate a somewhat greater degree of relationship with the major industries; and the industrial categories program appeared to indicate the highest degree of relationship of those programs representative of industrial arts in general, with the second criterion and its four sub-criteria.

The industrial arts program in Alberta was compared with industrial arts programs in general. The Alberta program was not unlike those of the trade and job analysis and behavioral change approaches. The design of the Alberta program and the courses within it were not unlike those being used in many programs in the United States.

The program of industrial arts suggested by Ziel was described and related to the six criteria particular to industrial arts programs. Phases one, two, and three (grades 7 - 10) were found to be compatible with the first criterion. This program was interpreted as indicating a fairly high degree of compatibility with the second criterion and its four sub-criteria. That is, the Ziel program appeared to relate to a large portion of the major industries in Alberta and Canada. Three features peculiar to the Ziel program were noted.

The descriptive analysis of industrial arts programs is completed. The following chapter, which concludes this study, summarizes this and the preceding chapters, and attempts to draw implications from the findings for programs and objectives of industrial arts education, with specific reference to this subject area in the Province of Alberta.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

I. CONCLUSIONS

Nine specific purposes established the scope of this study. The interpretation of the data obtained in the examination of each of the purposes resulted in the following conclusions.

The first purpose was to discover the ease of acceptance and degree of emphasis accorded industrial arts as one of many subject areas in the secondary education curriculum. Subject areas, such as mathematics, science, and language arts, which were stated definitely in the general objectives of secondary education did not require justification for their acceptance into the curriculum. Industrial arts, not mentioned specifically in the general objectives of secondary education, required justification for its acceptance into the curriculum. The ease of acceptance and degree of emphasis accorded industrial arts in the curriculum appeared to be influenced by five factors: (1) the degree of compatibility between industrial arts objectives and the general objectives of secondary education, (2) the philosophy of a school, (3) the aspirations of society, (4) the changing occupational structure in Canada, and (5) the degree of compatibility between the objectives of industrial arts and the functions of the junior and senior high schools.

The second purpose of the study was to establish the degree of compatibility between the objectives of industrial arts and the general

objectives of secondary education. Fourteen of the twenty-five industrial arts objectives in Alberta were found to indicate a high degree of compatibility with the general objectives of secondary education.

The third specific purpose of the study was to determine the body of subject matter indicated in lists of objectives of industrial arts and in the current literature on industrial arts education. The objectives of industrial arts in Alberta were found to indicate a body of subject matter related to the particular characteristics of manual training. The body of subject matter particular to industrial arts and educational sloyd seemed to receive the same degree of emphasis in the industrial arts objectives in Alberta.

Certain trends were evident in representative lists of industrial arts objectives. The trends were (1) the relative number of industrial arts objectives reflecting the particular characteristics of the general objectives of secondary education was decreasing, (2) the number of industrial arts objectives which indicated the particular characteristics of industrial arts was increasing, (3) the number of industrial arts objectives which indicated the particular characteristics of manual arts remained the same, (4) the number of industrial arts objectives which indicated the particular characteristics of manual training was decreasing, and (5) objectives of industrial arts did not reflect the particular characteristics of educational sloyd.

The fourth specific purpose of the study was to compare the industrial arts objectives in Alberta with objectives of industrial arts in general. It was found that Alberta had more objectives of industrial

arts which related to the particular characteristics of the general objectives of secondary education than did either of the three major approaches. This was interpreted as an indication that industrial arts was either not yet readily accepted into the Alberta secondary school curriculum or that industrial arts desired a greater degree of emphasis in a general education program.

The examination also found that Alberta had two out of twenty-five objectives of industrial arts which related to the particular characteristics of industrial arts education. This was interpreted as an indication that it would be difficult for the program of industrial arts in Alberta to develop understandings about the productive aspects of contemporary Canadian society.

The objectives of industrial arts in Alberta which indicated the particular characteristics of manual arts were found to be similar in number and kind to those included in industrial arts objectives, generally. The Alberta emphasis on the characteristics of manual training was found to be equal to that of the trade and job analysis approach to industrial arts education. The objectives of industrial arts in Alberta were also found to relate to the particular characteristics of educational sloyd.

The fifth specific purpose of the study was to determine the particular characteristics of industrial arts education. A survey of the literature indicated the following to be particular characteristics of industrial arts:

1. Industrial arts is a part of general education,
2. The body of subject matter of industrial arts is the world of work with industry as a salient component. This includes:
    a. the contribution of industrial developments to today's world,
    b. an understanding of industry, its methods of production, processes, and products,
    c. the development of skills in industrial processes,
    d. an understanding of the organization and the pattern of human-relationships in industry.

The sixth purpose of the study was to develop criteria for industrial arts program evaluation. A more thorough description of the particular characteristics of industrial arts served as the basis for the criteria; that is, the term general education as it is used in Alberta and the major industrial classifications in Alberta and Canada, were applied to the particular characteristics of industrial arts. The evaluative criteria for industrial arts programs which were developed are stated below:

1. The industrial arts program is so designed that all Alberta youth have access to it.
2. The industrial arts program interprets the world of work, with the major industries in Alberta and Canada as a salient component. This includes:
    a. the industrial arts program develops understandings and provides experiences in the methods of production, the

processes and the products, relevant to and resulting from the major industries in Alberta and Canada,

b. the industrial arts program explores occupations relevant to the major industries in Alberta and Canada,

c. the industrial arts program develops skills in the industrial processes relevant to the major industries in Alberta and Canada.

d. the industrial arts program develops understandings of the organization and patterns of human-relationships relevant to the major industries in Alberta and Canada.

The seventh specific purpose of the study was to examine industrial arts programs and relate them to the evaluative criteria. The junior high school level and the general mechanics section of the senior high school level in Alberta were found to be compatible with the first criterion. The program of industrial arts was found to indicate a very low degree of compatibility with the second criterion and the four sub-criteria.

The junior high school level of the trade and job analysis and the behavioral change programs were found to be compatible with the first criterion of program evaluation. The complete industrial categories program was found to be compatible with the first criterion. The trade and job analysis and the behavioral change programs were found to indicate a very low degree of compatibility with the second criterion and the four sub-criteria; that is, the two programs did not appear to reflect the major industrial classifications in Alberta and Canada which were considered as representative of the world of work for the purposes of this study.

The industrial categories program was found to indicate a considerable degree of relationship with the major industries in Alberta and Canada.

An alternative program of industrial arts suggested by Ziel was described and related to the six criteria particular to industrial arts programs. Phases one, two, and three (grades seven to ten), were found to be compatible with the first criterion. The Ziel program was interpreted as indicating a high degree of compatibility with the second criterion and its four sub-criteria; that is, the Ziel program appeared to relate to a large portion of the major industries in Alberta and Canada.

The eighth specific purpose of this study was to compare the Alberta industrial arts program with programs of industrial arts in general. The Alberta program was found to be similar to those suggested by the trade and job analysis and the behavioral change approaches. The industrial arts program in Alberta was compared with the findings of a study by Schmitt, Harrison, and Pelly, which analyzed thirty-nine industrial arts curriculum guides selected from State Departments of Education in the United States. The program of industrial arts in Alberta was found to be almost identical with the majority of programs reported by Schmitt, Harrison, and Pelly.

The ninth specific purpose of this study was to suggest topics of needed research in industrial arts education. These are stated in the following section on recommendations.

II. RECOMMENDATIONS

Recommendations resulting from the findings of this study are presented under two headings. Four recommendations pertain to industrial arts education in general; that is, to the subject area of industrial arts which is not limited to a specific geographical area. Four recommendations are pertinent to industrial arts education in the Province of Alberta.

Recommendations for Industrial Arts Education

1. Research should be undertaken so that the particular characteristics of industrial arts can be determined. This study has been an initial attempt to solve the problem. An exhaustive survey of the literature for the single purpose of determining the particular characteristics of industrial arts would be a worthwhile research study. Such research need not be limited only to those persons having an interest in industrial arts education *per se*. If industrial arts is one of many subject areas which are included in a general education curriculum, then the abilities and resources of persons concerned with the broad field of general education should be requested and utilized. Only after the particular characteristics of industrial arts have been determined and accepted can programs of industrial arts which reflect those characteristics be developed.

2. Industrial arts objectives should be formulated which emphasize a particular body of subject matter--a body of subject matter which

is consistent with the particular characteristics of industrial arts. This recommendation does not mean that a single list of industrial arts objectives needs to be developed and accepted. This recommendation does mean, however, that industrial arts objectives should be primarily concerned with the particular contributions that this subject area assumes as one of many subject areas in general education, and be less concerned with purporting that industrial arts can do nearly all things for almost everyone.

3. Experimental programs should be undertaken in an attempt to determine the length of time which should be devoted to industrial arts in the school curriculum. An interpretation of the literature indicated that proponents of industrial arts were more concerned with the evaluation of existing programs in relation to the total program of general education.

If the function of industrial arts is primarily that of introducing and acquainting students with the world of work and the phenomenon of industry, this author questions the justification of devoting six years of the formal school curriculum to this one segment of our culture. Perhaps three or four years would be sufficient to realize an acceptable measure of success in this connection. As an integral part of general education, proponents of industrial arts must acknowledge that there are many more bodies of subject matter, such as psychology, sociology, and philosophy, which also have an important function to perform in assisting in the development of each student to his unique potentiality and as a democratic citizen.

4. It is recommended that industrial arts education discontinue the practice of attempting to be both a part of general education and a part of specialized education in secondary school curriculums. The literature indicated that this dual purpose inherent in present programs was one of the major reasons for confusion and lack of direction in industrial arts. It is recommended that industrial arts be devoted to the contributions which can be made throughout general education, and transfer its specialized functions, currently present at the senior high school level, to vocational education.

Recommendations for Industrial Arts in Alberta

1. The functions and purposes of industrial arts education in Alberta require examination. If it can be agreed that industry and technology are important segments of our society concerning which Alberta youth require introduction and exploration through the formal school program, and if it can be agreed that industrial arts should be that subject area responsible for the transmission of an understanding of those segments of our society, then industrial arts should be accepted as an integral part of the general education curriculum in Alberta and not an appendage to it.

2. The objectives of industrial arts in Alberta require revision. They should be evaluated and revised in light of contemporary thought in industrial arts education. The revised objectives should indicate a definite body of subject matter which is compatible with the

particular characteristics of industrial arts. A program of industrial arts could then be developed which reflects the major industries in Alberta and Canada and remains within the boundaries established by the revised objectives.

3. It is recommended that the unit shop courses, which constitute the senior high school program of industrial arts, be discontinued. All Alberta youth are not permitted access to them and they do not appear to reflect the major industrial classifications in Alberta and Canada. They are designated as vocational courses and yet their inclusion in the curriculum is justified on the basis of their being a part of general education. Furthermore, the vocational high schools being built throughout the Province will result in a duplication of services. The duplication is in name only because the vocational high schools are better fitted than are industrial arts classrooms to provide this service.

4. It is recommended that the junior high school program of industrial arts be revised so that it reflects the major industrial classifications in Alberta and Canada. The present program does not lend itself to the development of understandings concerning industrial processes, products, skills, and methods of production. A program of industrial arts which emphasizes woodwork, metalwork, and drafting, does not reflect the major industrial classifications in Alberta and Canada.

BIBLIOGRAPHY

SELECTED BIBLIOGRAPHY

A. BOOKS

Bennett, Charles A. History of Manual and Industrial Education 1870 to 1917. Peoria: The Manual Arts Press, 1937.

Bennett, Charles A. The Manual Arts. Peoria, Illinois: The Manual Arts Press, 1919.

Bruner, Jerome S. The Process of Education. Cambridge: Harvard University Press, 1961.

Drucker, Peter F. The New Society. New York: Harpter and Brothers Publishers, 1949.

Dubin, Robert. The World of Work. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1958.

Ericson, Emanuel E. Teaching the Industrial Arts. Peoria: The Manual Arts Press, 1946.

Friese, John F. Course Making in Industrial Education. Peoria: Chas. A. Bennett Co. Inc. Publishers, 1958.

Fryklund, Verne C. Analysis Techniques for Instructors. Milwaukee: Bruce Publishing Company, 1956.

Fryklund, Verne C. Trade and Job Analysis. Milwaukee: Bruce Publishing Company, 1947.

Giachino, J. W. and Ralph O. Gallington. Course Construction in Industrial Arts and Vocational Education. Chicago: American Technical Society, 1957.

Good, Carter V. Dictionary of Education. Toronto: McGraw-Hill Publishing Company, 1959.

Jacobsen, Paul B. (ed.). General Education in the American High School. Chicago: Scott, Foresman and Company, 1942.

Micheels, William J. and Wesley S. Summers. The Minnesota Plan for Industrial Arts Teacher Education. Bloomington, Illinois: McKnight and McKnight Publishing Company, 1958.

Miller, Rex, and Lee H. Smalley. _Selected Readings for Industrial Arts_. Bloomington, Illinois: McKnight and McKnight Publishing Company, 1963.

Newkirk, Louis V. and William H. Johnson. _The Industrial Arts Program_. New York: The Macmillan Company, 1948.

Olson, Delmar W. _Industrial Arts and Technology_. Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1963.

Smith B. Othanel, William O. Stanley, and J. Harlan Shores. _Fundamentals of Curriculum Development_. New York: World Book Company, 1957.

Wilber, Gordon O. _Industrial Arts in General Education_. Scranton, Pennsylvania: International Textook Company, 1954.

Woodward, C. M. _Manual Training in Education_. New York: Charles Scribners Sons, 1911.

B. PUBLICATIONS OF THE DEPARTMENT OF EDUCATION IN ALBERTA

Alberta General Curriculum Committee. "The Split Personality of Technical Education," _Curriculum News Letter_. Edmonton: Department of Education of the Province of Alberta, October, 1958.

A Statement of the Place and Function of Industrial Arts in Education. A Paper Prepared by the Division of Industrial Arts. Edmonton: Department of Education of the Province of Alberta, Summer, 1962.

Industrial Arts Newsletter. Edmonton: Department of Education of the Province of Alberta, September, 1957.

Curriculum Guide for Alberta Secondary Schools. Edmonton: Department of Education of the Province of Alberta, January, 1950.

Junior High School Handbook. Edmonton: Department of Education of the Province of Alberta, 1962.

Senior High School Handbook. 1962-63. Edmonton: Department of Education of the Province of Alberta, 1962.

Junior High School Curriculum Guide for Industrial Arts Grades 7, 8, 9. Interim edition. Edmonton: Department of Education of the Province of Alberta, September, 1954.

Senior High School Curriculum Guide for Arts and Crafts 10, 20, 30. Interim edition. Edmonton: Department of Education of the Province of Alberta, September, 1954.

Senior High School Curriculum Guide for Automotives 10, 21, 20, 30. Interim edition. Department of Education of the Province of Alberta, September, 1954.

Senior High School Curriculum Guide for Drafting 10, 20 and Special Shop Drafting Outline for Shop Students. Interim edition. Edmonton: Department of Education of the Province of Alberta, September, 1954.

Senior High School Curriculum Guide for Electricity 10, 21, 20, 30. Interim edition. Edmonton: Department of Education of the Province of Alberta, September, 1954.

Senior High School Curriculum Guide for General Mechanics 15, 16, 17. Interim edition. Edmonton: Department of Education of the Province of Alberta, September, 1955.

Senior High School Curriculum Guide for Metalwork 10, 21, 20, 30. Interim edition. Edmonton: Department of Education of the Province of Alberta, September, 1954.

Senior High School Curriculum Guide for Printing 10, 20. Interim edition, Edmonton: Department of Education of the Province of Alberta, September, 1954.

Senior High School Curriculum Guide for Woodwork 10, 21, 20, 30. Interim edition. Edmonton: Department of Education of the Province of Alberta, September, 1954.

C. PUBLICATIONS OF THE GOVERNMENT, LEARNED SOCIETIES, AND OTHER ORGANIZATIONS

A Teaching Career in Industrial Arts. A Brochure prepared by the Department of Industrial and Vocational Education, University of Alberta. Edmonton: University Printing Service, 1962.

American Vocational Association. A Guide to Improving Instruction in Industrial Arts. Prepared by the Industrial Vocational Association. Washington: 1953.

American Vocational Association. Evaluative Criteria for Industrial Arts Education. Prepared by the Industrial Arts Education Division of the American Vocational Association. Trenton, New Jersey: Graphics Arts Department of Trenton State College, 1961.

Department of Labour. "Number 1, Progress Report," Research Program on the Training of Skilled Manpower. Ottawa: Queen's Printer, June, 1957.

Department of Labour. "Number 2, Technological Changes and Skilled Manpower: Electrical and Electronics, Industry and Heavy Machinery Industry," Research Program on the Training of Skilled Manpower. Ottawa: Queen's Printer, August, 1957.

Department of Labour. "Number 3, Technological Changes and Skilled Manpower: The Household Appliance Industry," Research Program on the Training of Skilled Manpower. Ottawa: Queen's Printer, September, 1958.

Department of Labour. "Number 5A, Vocational Training Programs in Canada - Technical and Trade Training - Publicly Operated," Research Program on the Training of Skilled Manpower. Ottawa: Queen's Printer, July, 1959.

Department of Labour. "Number 5B, Vocational Training Programs in Canada - Commercial, Service and Other Occupations - Publicly Operated," Research Program on the Training of Skilled Manpower. Ottawa: Queen's Printer, July, 1959.

Dominion Bureau of Statistics. Census of Canada: 1961, Labour Force. Industries by Sex, Bulletin 3.2-1. Ottawa: Queen's Printer, 1963.

Education for a Changing World of Work. Report of the Panel of Consultants on Vocational Education. Washington: United States Government Printing Office, 1963.

General Education. The Fifty-First Yearbook of the National Society for the Study of Education, Part I. Chicago: The University of Chicago Press, 1952.

General Education in a Free Society. A Report of the Harvard Committee. Cambridge: Harvard University Press, 1958.

Hostetler, Ivan, and Talmage B. Young. A Guide to Curriculum Study: Industrial Arts. Raleigh, North Carolina: North Carolina State Board of Education, 1959.

Improving Industrial Arts Teaching. A Conference Report - 1960, United States Department of Health, Education and Welfare, Circular No. 656. Washington: United States Government Printing Office, 1962.

Industrial Arts Education. A Bulletin Prepared by the American Council of Industrial Arts Supervisors, for the American Industrial Arts Association, Inc., a Department of the National Education Association. Bloomington, Illinois: McKnight and McKnight Publishing Company, 1963.

Lux, Donald G. (ed.). Essentials of Preservice Preparation. Eleventh Yearbook of the American Council on Industrial Arts Teacher Education, a Division of the American Industrial Arts Association and the National Education Association. Bloomington, Illinois: McKnight and McKnight Publishing Company, 1962.

Norman, Ralph R. and R. C. Bohn (co-eds.). Graduate Study in Industrial Arts. Tenth Yearbook of the American Council of Industrial Arts Teacher Education, A Division of the American Industrial Arts Association and the National Education Association. Bloomington, Illinois: McKnight and McKnight Publishing Company, 1961.

Ohio Education Association and Ohio State Department of Education (sponsors). A Prospectus for Industrial Arts. Columbus: State Department of Education, 1934.

Olson, Delmar W. "Technology and Industrial Arts." Doctoral dissertation, Kent State University, Kent, Ohio. Columbia, Ohio: Epsilon Pi Tau, Inc., 1957.

Piggott, Arthur V. Education and Employment. Conference Study Number 9, Canadian Conference on Education, 1962. Ottawa: Mutural Press Ltd., 1961.

Preparing Pupils For The World Of Work. Report and recommendations of a Special Committee to the Board of Education of the City of Detroit. Detroit: Department of Publications, Detroit Public Schools, 1962.

Report of the Royal Commission on Education in Alberta - 1959. A Report Submitted to the Lieutenant Governor of Alberta by the Hon. Senator Donald Cameron (chairman), Edmonton: The Queen's Printer, 1959.

Report of the Select Committee on Manpower Training. A Report Presented to the Ontario Legislative Assembly by Hon. J. R. Simonett, (chairman). Toronto: February, 1963.

Schmitt, Marshall L., Paul E. Harrison, and Albert L. Pelly. Industrial Arts, An Analysis of 39 State Curriculum Guides: 1953-1958. Bulletin 1961, No. 17. Washington: United States Government Printing Office, 1961.

Selvidge, R. W., "Discussion," Journal of Proceedings and Addresses of the National Education Association for 1912. Washington: National Education Association, 1912.

Svendsen, Ethan A. T. (ed.). Action and Thought in Industrial Arts Education. Twelfth Yearbook of the American Council on Industrial Arts Teacher Education, A Division of the American Industrial Arts Association and the National Education Association. Bloomington, Illinois: McKnight and McKnight Publishing Company, 1963.

Warner, William E., et al. An Industrial Arts Curriculum to Reflect Technology at All School Levels. Columbus, Ohio: Epsilon Pi Tau, Inc., 1947.

Wenrich, R. C. "Vocational Education," Encyclopedia of Educational Research. 3rd edition. Chester W. Harris (ed.). New York: The Macmillan Company, 1960.

PERIODICALS

Feirer, J. L. "Let's Take The Offensive," Industrial Arts and Vocational Education. XLIX:6 (June, 1960), p. 13.

Feirer, J. L. "Technology and Industry in Our Schools," Industrial Arts and Vocational Education, 50:5 (May, 1961), p. 48.

Feirer, J. L. "Editors Note," Industrial Arts and Vocational Education, 50:1 (January, 1961), p. 11.

Huggens, S. D. "Industry's View of Industrial Arts," Industrial Arts and Vocational Education. (June, 1961), pp. 17-18.

Karnes, M. Ray. "Improving Industrial Arts Education: Some Dimensions of the Problem," Industrial Arts Teacher. XIX:5 (May-June, 1960), pp.

Micheels, William J. "Industrial Arts Education," The Three R's Plus. Robert H. Beck (ed.). Minneapolis: University of Minnesota Press, 1956. pp. 245-253.

Ziel, Henry R. "Industrial Arts and Vocational Education in a Changing Society," The ATA Magazine. 43:1 (September, 1962), pp.16-18.

Ziel, Henry R. "Vocational Education in a Changing Society," The ATA Magazine. 43:3 (November, 1962), pp. 12-15.

Ziel, Henry R. "A New Concept of the Industrial Arts Program," The ATA Magazine. 43:6 (February, 1963), pp. 17-21.

E. UNPUBLISHED MATERIALS

Stadt, Ronald W. "A Method of Selecting Content for Lending Intelligibility to Industry: A Critique and a Proposal." Unpublished Doctoral dissertation, The University of Illinois, Urbana, Illinois, 1962.

APPENDIX

TABLE I

LABOUR FORCE[1], 15 YEARS OF AGE AND OVER,

BY INDUSTRY AND SEX, FOR CANADA AND ALBERTA, 1961

Industry	Canada[2]		Alberta	
	M	F	M	F
All industries	4,705,518	1,766,332	361,961	127,550
Agriculture	562,075	78,711	90,033	13,540
Farms	547,143	77,037	88,845	13,324
Services incidental to agriculture	14,932	1,674	1,188	216
Forestry	106,387	2,193	2,698	86
Logging	92,361	1,505	1,185	38
Forestry services	14,026	688	1,513	48
Fishing and trapping	35,748	515	822	17
Fishing	29,873	318	279	11
Fishery services	2,169	151	38	-
Hunting and trapping	3,706	46	505	6
Mines[3], quarries, oil wells . .	116,852	4,850	15,124	2,226
Metal mines	67,314	1,617	213	13
Placer gold mines	622	29	16	-
Gold quartz mines	16,215	301	32	2
Copper-gold-silver mines ..	11,810	330	26	1
Nickel-copper mines	17,470	201	25	2
Silver-cobalt mines	587	14	7	-
Silver-lead-zinc mines . ..	4,303	124	4	-
Uranium mines	5,903	137	85	5
Iron mines	9,571	455	3	-
Other metal mines	833	26	15	3
Mineral fuels	18,496	1,269	6,089	1,076
Coal mines	12,344	107	1,483	24
Petroleum and gas wells . .	5,084	1,049	4,035	992
Natural gas processing plants	1,059	113	569	60
Oil shale and bituminous sand pits	9	-	2	-

Industry	Canada		Alberta	
	M	F	M	F
Non-metal mines, except coal mines	11,106	359	178	15
Asbestos mines	6,685	165	34	2
Gypsum mines	665	8	1	-
Salt mines	901	71	57	6
Other non-metal mines	2,855	115	86	7
Quarries and sand pits	5,957	163	470	16
Stone quarries	2,586	55	3	-
Sand pits or quarries	3,371	108	467	16
Services incidental to mining	13,979	1,442	8,174	1,106
Petroleum prospecting	3,676	783	3,162	733
Other prospecting	1,176	106	21	1
Contract drilling for petroleum	4,591	310	3,613	276
Other contract drilling	2,230	87	34	2
Other services incidental to mining	2,306	156	1,344	94
Manufacturing industries	1,102,874	301,991	34,923	7,294
Food and beverage industries	169,569	49,616	10,511	2,806
Meat products industries	24,891	7,244	3,441	964
Slaughtering and meat processors	23,352	6,089	3,413	924
Poultry processors	1,539	1,155	28	40
Dairy products industries	33,868	5,276	2,357	482
Dairy factories	32,832	4,916	2,355	482
Process cheese manufacturers	1,036	360	2	-
Fish products industry	14,724	5,740	42	10
Fruit and vegetable canners, preservers	8,840	5,041	250	129
Grain mills	12,982	1,804	1,013	129
Feed manufacturers	6,673	635	324	22
Flour mills	4,901	592	675	93
Breakfast cereal manufacturers	1,408	577	14	14
Bakery products industries	32,811	12,610	1,589	811
Biscuit manufacturers	3,634	3,228	20	15
Bakeries	29,177	9,382	1,569	796

Industry	Canada[2]		Alberta	
	M	F	M	F
Manufacturing industries - (continued)				
Food and beverage industries - (continued)				
Other food processors	15,059	8,563	510	143
Confectionery manufacturers.	4,282	4,016	27	14
Sugar refineries	2,522	404	242	17
Vegetable oil mills	507	60	28	2
Miscellaneous food industries	7,748	4,083	213	110
Beverage manufacturers	26,394	3,338	1,309	138
Soft drink manufacturers . .	12,707	1,139	608	86
Distilleries	3,398	1,434	81	19
Breweries	9,788	686	619	33
Wineries	501	79	1	-
Tobacco products industries. .	4,490	4,343	4	2
Leaf tobacco processing . .	556	219	1	-
Tobacco products manufacturing	3,934	4,124	3	2
Rubber industries	14,754	4,090	204	9
Rubber footwear manufacturers	2,704	1,687	1	-
Tire and tube manufacturers.	7,982	1,044	194	7
Other rubber industries . ..	4,068	1,359	9	2
Leather industries	18,839	14,327	100	37
Leather tanneries	3,161	495	10	2
Shoe factories	11,528	9,711	14	8
Leather glove factories . ..	675	1,155	8	7
Luggage, handbag and small leather goods manufacturers	3,475	2,966	68	20
Textile industries	41,935	20,317	121	106
Cotton yarn and cloth mills .	12,675	5,920	-	1
Woollen mills	5,067	3,149	1	-
Wool yarn mills	988	1,138	1	-
Wool cloth mills	4,079	2,011	-	-
Synthetic textile mills . . .	11,747	3,274	12	1
Other primary textile mills .	7,461	2,770	12	2
Fibre preparing mills	512	106	1	-
Thread mills	328	382	-	-
Cordage and twine industry .	769	265	-	-
Narrow fabric mills	1,060	875	2	-

Industry	Canada[2]		Alberta	
	M	F	M	F
Manufacturing industries - (continued)				
Textile industries (continued)				
Pressed and punched felt mills	244	53	1	-
Carpet, mat and rug industry	1,229	539	3	2
Textile dyeing and finishing plants	1,392	265	2	-
Linoleum and coated fabrics industry	1,927	285	3	-
Other textile industries . ..	4,985	5,204	96	102
Canvas products industry . .	895	667	51	39
Cotton and jute bag industry	484	589	27	32
Miscellaneous textile industries	3,606	3,948	18	31
Knitting mills	7,307	12,439	10	23
Hosiery mills	3,598	5,310	2	-
Other knitting mills	3,709	7,129	8	23
Clothing industries	32,708	59,220	360	1,049
Custom tailoring shops . . .	3,787	1,659	135	63
Men's clothing industry . .	11,895	21,798	172	862
Women's clothing industry ..	8,312	22,488	27	75
Children's clothing industry	1,737	4,805	-	1
Fur goods industry	3,839	1,693	14	18
Hat and cap industry	1,772	2,234	6	17
Foundation garment industry.	784	3,260	2	9
Other clothing industries ..	582	1,283	4	4
Wood industries	93,207	5,664	2,823	282
Sawmills	56,497	1,666	1,191	54
Veneer and plywood mills . .	8,966	1,489	311	92
Sash and door and planing mills	17,896	1,130	1,021	109
Wooden box factories	2,753	445	78	2
Coffin and casket industry .	1,143	232	29	17
Miscellaneous wood industries	5,952	702	193	8

Industry	Canada[2]		Alberta	
	M	F	M	F
Manufacturing industries - (continued)				
Furniture and fixture industries.	31,049	4,647	911	133
Household furniture industry	21,150	2,632	499	70
Office furniture industry.	2,309	316	14	-
Other furniture industries	6,972	1,300	397	62
Electric lamp and shade industry	618	399	1	1
Paper and allied industries	88,938	12,702	1,154	173
Pulp and paper mills . . .	67,769	4,372	582	40
Asphalt roofing manufacturers	2,332	238	226	13
Paper box and bag manufacturers	12,209	5,057	290	106
Other paper converters . .	6,628	3,035	56	14
Printing, publishing and allied industries	62,649	21,616	2,824	861
Commercial printing	24,187	8,510	816	286
Engraving, stereotyping and allied industries	5,628	1,463	52	8
Printing and publishing ..	32,834	11,643	1,956	567
Primary metal industries ..	85,161	4,995	1,153	55
Iron and steel mills . . .	36,904	1,859	422	21
Steel pipe and tube mills.	3,318	160	309	12
Iron foundries	9,202	593	327	18
Smelting and refining . ..	23,172	1,114	9	-
Aluminum rolling, casting and extruding	6,823	757	42	2
Copper and alloy rolling, casting and extruding. ..	3,804	249	15	-
Metal rolling, casting and extruding, n.e.s.[4]	1,938	263	29	2

Industry	Canada[2]		Alberta	
	M	F	M	F
Manufacturing industries (continued)				
Metal fabricating industries[5]	91,841	11,375	3,456	267
Boiler and plate works . . .	6,548	600	301	19
Fabricated structural metal industry	13,359	695	1,013	66
Ornamental and architectural metal industry	7,884	687	297	40
Metal stamping, pressing and coating industry	18,726	2,922	572	51
Wire and wire products manufacturers	8,591	1,281	51	5
Hardware, tool and cutlery manufacturers	8,217	1,770	83	7
Heating equipment manufacturers	6,548	654	128	19
Machine shops	8,987	534	739	43
Miscellaneous metal fabricating industries	12,981	2,232	272	17
Machinery industries[6]	43,909	5,912	670	64
Agricultural implement industry	11,850	947	198	15
Miscellaneous machinery and equipment manufacturers . .	25,237	3,483	443	44
Commercial refrigeration and air-conditioning equipment manufacturers	1,724	199	13	-
Office and store machinery manufacturers	5,098	1,283	16	5
Transportation equipment industries	108,430	9,591	1,663	127
Aircraft and parts manufacturers	26,593	2,874	712	93
Motor vehicle manufacturers.	30,327	2,237	10	1
Truck body and trailer manufacturers	3,336	219	283	14
Motor vehicle parts and accessories manufacturers .	13,406	3,014	139	13

Industry	Canada[2]		Alberta	
	M	F	M	F
Manufacturing industries - (continued)				
Transportation equipment industries (continued)				
Railroad rolling stock industry	14,513	277	483	5
Ship building and repair . .	15,711	560	3	-
Boat building and repair . .	4,278	356	33	1
Miscellaneous vehicle manufacturers	266	54	-	-
Electrical products industries	62,674	22,250	330	70
Manufacturers of small electrical appliances	3,691	1,607	7	1
Manufacturers of major appliances[7].	15,301	2,839	14	3
Manufacturers of household radio and television receivers	5,227	2,554	8	1
Communications equipment manufacturers	16,469	7,772	29	24
Manufacturers of electrical industrial equipment	10,425	3,002	150	26
Battery manufacturers	1,296	529	82	10
Manufacturers of electric wire, cable	4,055	541	2	1
Manufacturers of miscellaneous electrical products ..	6,210	3,406	38	4
Non-metallic mineral products industries	42,485	4,534	3,049	396
Cement manufacturers	3,897	176	447	23
Lime manufacturers	558	26	89	6
Gypsum products manufacturers	2,142	102	193	5
Concrete products manufacturers	9,811	391	1,047	42
Ready-mix concrete manufacturers	2,853	103	151	5
Clay products manufacturers.	5,620	651	467	32
Refractories manufacturers .	659	50	7	1
Stone products manufacturers	1,902	103	70	13

Industry	Canada[2]		Alberta	
	M	F	M	F
Manufacturing industries - (continued)				
Non-metallic mineral products industries (continued)				
Mineral wood manufacturers .	271	17	21	1
Asbestos products manufacturers	2,768	356	15	1
Glass and glass products manufacturers	9,159	2,162	500	244
Abrasives manufacturers . ..	2,382	279	7	-
Other non-metallic mineral products industries	463	118	35	23
Petroleum and coal products industries	15,249	1,710	2,075	344
Petroleum refineries	14,383	1,653	2,050	344
Other petroleum and coal products industries	866	57	25	-
Chemical and chemical products industries	52,661	16,849	2,759	328
Explosives, ammunition manufacturers	3,821	913	124	10
Manufacturers of mixed fertilizers	2,065	215	272	14
Manufacturers of plastics and synthetic resins	4,376	758	370	42
Manufacturers of pharmaceuticals and medicines	6,914	4,196	97	3
Paint and varnish manufacturers	6,240	1,520	81	15
Manufacturers of soap and cleaning compounds	4,212	1,204	40	16
Manufacturers of toilet preparations	1,440	4,209	7	12
Manufacturers of industrial chemicals	10,508	1,080	133	16
Other chemical industries ..	13,085	2,754	1,635	200

Industry	Canada[2]		Alberta	
	M	F	M	F
Manufacturing industries - (continued)				
Miscellaneous manufacturing industries	35,019	15,794	746	162
Scientific and professional equipment manufacturers .	8,699	3,706	238	67
Jewellery and silverware manufacturers	2,930	1,643	22	6
Broom, brush and mop industry	2,055	831	7	2
Venetian blind manufacturers	534	206	11	3
Plastic fabricators, n.e.s.[4]	4,386	2,006	69	22
Sporting goods and toy industry	4,014	2,396	12	7
Fur dressing and dyeing industry	408	108	6	1
Signs and displays industry	4,309	564	317	36
Miscellaneous manufacturing industries, n.e.s.[4] . . .	7,684	4,334	64	18
Construction industry	420,317	10,776	36,184	1,176
General contractors	218,171	5,401	21,139	688
Building construction	153,725	3,859	12,967	441
Highway, bridge and street construction	41,232	988	5,048	161
Other construction	23,214	554	3,124	86
Special trade contractors .	202,146	5,375	15,045	488
Transportation, communication and other utilities	520,192	83,094	40,913	6,522
Transportation	363,050	21,981	28,206	1,779
Air transport	16,072	4,202	1,480	277
Services incidental to air transport	2,052	220	210	40
Water transport	22,673	1,399	249	24
Services incidental to water transport	14,224	572	16	-
Railway transport	132,779	6,864	10,864	494
Truck transport	85,410	3,385	8,588	384

Industry	Canada[2]		Alberta	
	M	F	M	F
Transportation, communication and other utilities - (continued)				
Transportation (continued)				
Bus transport, interurban and rural	6,134	678	496	104
Urban transit systems . ..	17,882	771	936	8
Taxicab operations	20,242	1,024	748	87
Pipeline transport	2,668	323	864	112
Highway and bridge maintenance	35,446	849	2,431	80
Other services incidental to transport	3,949	1,418	236	66
Other transportation . .	3,519	276	1,088	103
Storage	15,775	1,902	2,882	360
Grain elevators	9,983	830	2,251	209
Other storage and warehousing	5,792	1,072	631	151
Communication	79,227	50,847	5,651	3,931
Radio and television broadcasting	12,713	4,679	674	261
Telephone systems	27,873	34,247	2,283	2,685
Telegraph and cable systems	6,724	1,410	502	126
Post office	31,917	10,511	2,192	859
Electric power, gas and water utilities	62,140	8,364	4,174	452
Electric power	46,319	6,722	1,854	226
Gas distribution	8,231	1,347	1,502	201
Water systems	5,680	254	760	24
Other utilities	1,910	41	58	1
Trade	690,028	301,462	56,027	24,069
Wholesale trade	237,279	52,605	22,858	4,625
Livestock	2,146	191	354	30
Grain	1,916	919	162	53

Industry	Canada[2]		Alberta	
	M	F	M	F
Trade (continued)				
Wholesale trade (continued)				
Coal and coke	1,650	310	32	8
Petroleum products	20,824	4,082	2,418	565
Paper and paper products ..	4,058	1,387	226	72
General merchandise	483	159	15	4
Food	34,060	8,514	2,100	757
Tobacco products	3,044	684	189	47
Drugs and toilet preparations	4,660	2,739	401	116
Apparel and dry goods . . .	5,777	2,271	249	111
Furniture and house furnishings	2,894	871	252	68
Motor vehicles and accessories	15,284	2,767	2,064	342
Electrical machinery, equipment and supplies	11,325	2,912	902	229
Farm machinery and equipment	12,263	1,219	2,642	264
Machinery and equipment, n.e.s.[4]	27,736	5,769	3,748	632
Hardware, plumbing and heating equipment	14,006	3,433	1,269	305
Metal and metal products, n.e.s.[4]	3,795	839	253	35
Lumber and building materials	32,879	3,745	3,169	429
Scrap and waste materials .	7,210	549	408	22
Wholesalers, n.e.s.[4]	31,269	9,245	2,005	536
Retail trade	452,749	248,857	33,169	19,444
Food stores	97,843	53,709	4,834	3,351
General merchandise stores ..	59,896	102,418	5,124	9,030
Department stores	37,191	66,819	3,320	6,323
Variety stores	6,743	25,490	298	1,501
Other general merchandise stores	15,962	10,109	1,506	1,206
Retailers of automotive products	165,889	10,624	14,790	1,068
Accessory, parts, tire and battery shops	12,778	1,440	742	50

Industry	Canada[2]		Alberta	
	M	F	M	F
Trade (continued)				
Retail trade (continued)				
Gasoline service stations	43,876	2,487	4,428	348
Motor vehicle dealers	54,793	5,035	5,409	491
Motor vehicle repair shops	54,442	1,662	4,211	179
Apparel and shoe stores	24,131	38,060	1,163	2,261
Shoe stores	6,406	3,081	257	235
Men's clothing stores	7,159	1,686	427	138
Women's ready-to-wear stores	4,149	20,194	193	1,299
Clothing and dry goods stores, n.e.s.[4]	6,417	13,099	286	589
Hardware stores	15,446	4,785	1,427	559
Household furniture and appliance stores	30,093	7,072	2,071	445
Household furniture and appliance stores	22,274	6,500	1,559	398
Radio, television and electrical appliance repair shops	7,819	572	512	47
Drug stores	14,171	12,762	1,068	1,407
Other retail stores	45,280	19,427	2,692	1,323
Book and stationery stores	2,517	2,469	254	165
Florists' shops	2,564	2,662	150	233
Fuel dealers	8,818	1,212	58	10
Jewellery stores	4,789	4,436	324	308
Watch and jewellery repair shops	2,038	193	117	8
Liquor, wine and beer stores	9,005	659	738	38
Tobacconists	1,484	1,403	21	61
Retail stores, n.e.s.[4]				
Finance, insurance and real estate	124,310	104,595	7,940	6,755
Financial institutions	53,970	56,966	3,620	4,305
Savings and credit institutions	43,656	51,821	3,038	4,010
Investment companies and security dealers	10,314	5,145	582	295

Industry	Canada[2]		Alberta	
	M	F	M	F
Finance, insurance and real estate (continued)				
Insurance and real estate industries	70,340	47,629	4,320	2,450
Insurance and real estate agencies	63,121	44,375	3,867	2,196
Real estate operators . ..	7,219	3,254	453	254
Community, business and personal service industries ..	513,917	749,445	37,057	56,367
Education and related services	102,975	163,926	8,280	12,704
Elementary and secondary schools	75,531	141,160	6,380	11,004
Vocational schools	4,367	2,123	440	234
Universities and colleges.	20,166	12,130	1,226	669
Libraries, museums and other repositories	1,380	4,175	109	327
Education and related services, n.e.s.[4]	1,531	4,338	125	470
Health and welfare services	82,457	224,976	5,709	17,561
Hospitals	51,221	176,475	3,345	13,638
Offices of physicians . ..	14,006	11,896	1,019	1,228
Offices of dentists	5,143	4,242	395	384
Other health services . ..	5,515	13,051	525	1,061
Welfare organizations . ..	6,572	19,312	425	1,250
Religious organizations . .	29,992	23,138	1,937	864
Motion picture and recreational services	28,717	11,120	2,148	1,096
Motion picture theatres, film exchanges	5,267	4,379	397	436
Bowling alleys and billiard parlours	4,778	801	404	75
Other recreational services	18,672	5,940	1,347	585

Industry	Canada[2]		Alberta	
	M	F	M	F
Community, business and personal service industries (continued)				
Services to business management	64,439	34,548	4,837	2,348
Accountancy service	14,031	4,555	1,163	394
Advertising service	5,368	3,289	147	85
Engineering and scientific service	21,630	3,473	1,973	303
Legal service	12,082	12,814	846	916
Other services to business management	11,328	10,417	708	650
Personal services	162,934	274,584	10,752	20,109
Shoe repair shops	4,912	273	354	17
Barber and beauty shops ..	18,713	22,992	1,213	1,548
Private households	8,019	90,324	247	5,531
Laundries, cleaners and pressers	18,525	21,055	1,132	1,814
Hotels, restaurants and taverns	101,023	106,125	7,266	9,705
Lodging houses and residential clubs	4,364	27,429	192	1,140
Funeral directors	3,277	467	177	32
Dressmaking	134	3,939	2	188
Other personal services ..	3,967	1,980	169	134
Miscellaneous services . ..	42,403	17,153	3,394	1,685
Labour organizations and trade associations. . . .	4,707	3,561	230	198
Photography	3,814	2,094	258	256
Blacksmithing and welding shops	6,369	114	854	13
Miscellaneous repair shops	2,339	153	165	10
Services to buildings and dwellings	6,457	3,273	397	504
Other miscellaneous services	18,717	7,958	1,490	704

Industry	Canada[2]		Alberta	
	M	F	M	F
Public administration and defence	396,239	86,686	32,226	6,401
Federal administration . ..	234,022	50,931	17,821	3,074
Defence services	156,683	16,346	13,243	1,189
Other federal administration	77,339	34,585	4,578	1,885
Provincial administration .	47,144	21,617	4,651	2,208
Local administration	110,953	12,776	9,704	1,092
Other government offices ..	4,120	1,362	50	27
Industry unspecified or undefined	116,579	42,014	8,014	3,097

Footnotes:

[1] Excludes a few persons seeking work who have never been employed.

[2] Includes Yukon and Northwest Territories.

[3] Includes milling.

[4] n.e.s. = not elsewhere specified.

[5] Excludes electrical machinery industries.

[6] Includes manufacturers of non-electric major appliances.

University of Alberta Library
0 1620 1066 9362

B29816